A PRACTICAL TREATISE

ON THE

CULTIVATION

OF

THE GRAPE VINE

ON OPEN WALLS.

BY CLEMENT HOARE.

SECOND AMERICAN EDITION.

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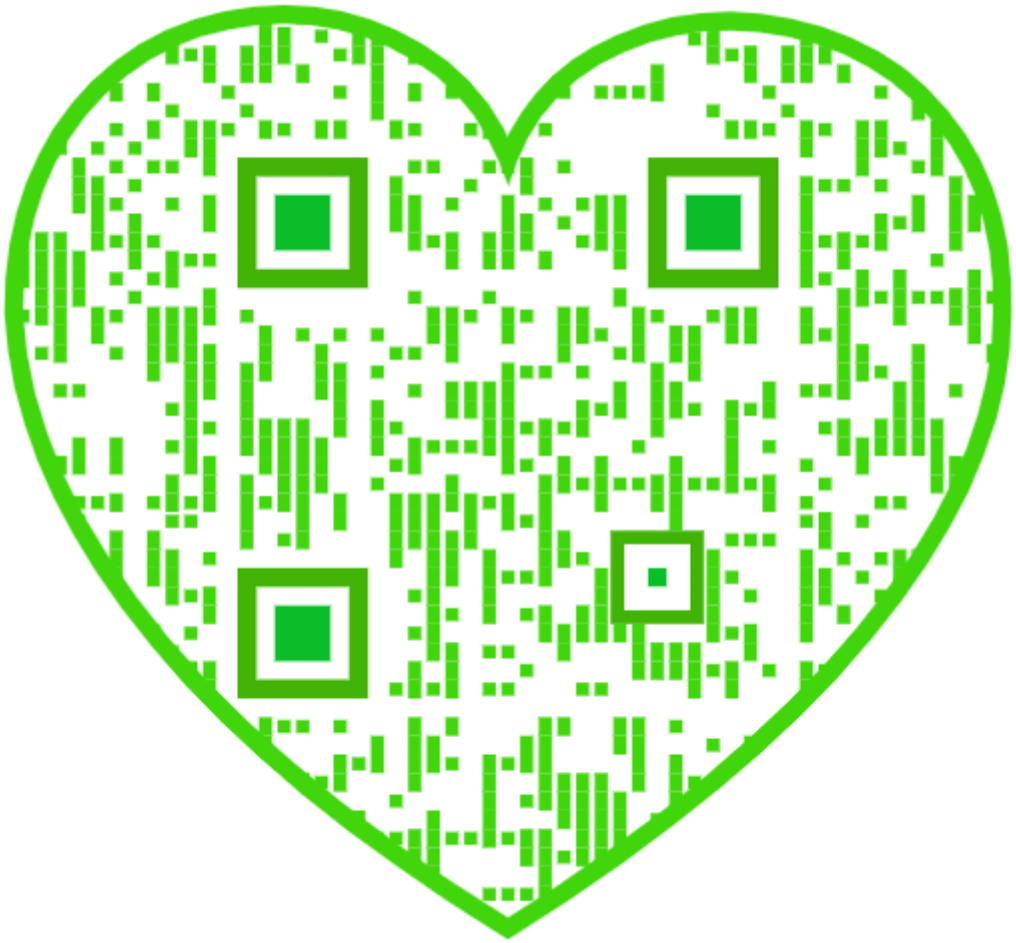

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To the Members of the Horticultural Society of Massachusetts.

513-42 Hoare

GENTLEMEN:

Permit me to dedicate to you a reprint of HOARE'S PRACTICAL TREATISE ON THE CULTIVATION OF THE GRAPE VINE ON OPEN WALLS. I am pursuaded that a cursory perusal of it will indicate the causes of the general failure of our vines, and that a strict adherence to the severe discipline so clearly illustrated by the author, will restore the confidence of the horticulturists of Boston and its vicinity in the capacity of their climate to mature in the open air some of the best varieties of foreign grapes.

This Treatise has been submitted to the judgment of a distinguished horticulturist: his unqualified approbation of the work is annexed, and will receive from the reader the respect which has been long rendered to his experience.

That this work may renew the zeal of those of your members who have labored long in the vineyard without adequate reward, is the wish,

Gentlemen,

Of yours, respectfully,

GEORGE W. BRIMMER.

Boston, September 4, 1837.

To G. W. Brimmer, Esq.

I return you the Treatise on the Cultivation of the Grape Vine on open Walls, by Mr. Hoare, with many thanks for your kindness in leaving it so long in my hands. I have read this little book with great pleasure and interest, and have derived much valuable information from its pages. The general principles laid down by the author, although applied to the culture of the vine on open walls, are, in my opinion, highly valuable as fundamental rules for the treatment of this plant in all situations, whether indoor or out, on open walls, or open trellisses, in town or country,—in fact, wherever the grape vine is cultivated as an edible fruit. Although Mr. Hoare's mode of training the vine differs essentially from that commonly practiced by gardeners, yet the leading principle of his practice will apply equally well to the training of vines on rafters in grape houses; and I am by no means sure that, where the roof of the house alone is appropriated to the cultivation of this fruit, that his mode of training might not be adopted with advantage, even under glass. I have been for many years in the habit of raising bearing shoots from arms formed in the manner described by Mr. Hoare; but I have unfortunately allowed those arms to extend too far from the stem of the vine, and the consequences pointed out by him have been invariably produced throughout my grape-houses. I have eight or ten vines of this description, of an age and size to be put into bearing during the next year and the year after, and which have not been allowed to injure themselves by bearing. I trust I may be able to test his practice on these vines, by adhering strictly to his rules.

Under Mr. Hoare's plan of cultivation, any man who owns a brick house in any town not north of Massachusetts, may, if his yard be open to the south in any degree, raise as many grapes

as will supply his family, without an expense of more time or money than is usually wasted in idleness. Indeed, on the common wooden houses and fences with which our yards are surrounded, good and abundant crops may be had by putting up cheap trellisses, which would be paid for in two or three years after the vines get into bearing. But the rules laid down by Mr. Hoare must be adhered to, *especially in not attempting to fruit the vines before they are of a proper age and size*; when I fully believe that patience will be amply compensated.

I hope you will think it worth while to have Mr. Hoare's Treatise reprinted, as it will induce many persons, who have means, to undertake the cultivation of this healthful and delicious fruit; and, by their example, will lead to a general propagation of the vine throughout the State.

Very respectfully,

Your ob't Serv't,

SAMUEL G. PERKINS.

Brookline, September 1, 1837.

To the Right Honorable, the Earl of Arran.

MY LORD:

I feel great pleasure in dedicating the following treatise on the Vine to your Lordship, as the warm and generous patron of every improvement in the science of horticulture.

In endeavoring to disseminate the knowledge of an improved mode of cultivating the grape vine, and thereby to open, almost, a new source of agreeable domestic enjoyment, and of profitable recreation, I consider it an honor to receive the powerful aid of your Lordship's countenance and approbation.

In the earnest hope that Providence may be pleased to prolong for many years the benevolent and useful life of your Lordship, I beg to subscribe myself,

With great respect,

Your Lordship's obliged

And humble Servant,

THE AUTHOR.

PREFACE.

THERE is not, that I am aware of, any work extant in the English language, that exclusively treats of the vine, except the "*Treatise on the Culture of the Vine*," written by Speechly, in the year 1789. That work, however, though undoubtedly a valuable one, and showing on the part of the author a thorough practical knowledge of the nature of the vine, in reference to its culture under glass, is yet, not sufficiently full nor explicit with regard to the management of that plant, when cultivated on the open wall. Hence the principal reason of the appearance of this volume.

In compiling it, I have endeavored, in as plain and as concise a manner as the nature of the subject would admit, to embody all the necessary points of culture with the principles on which they are founded, and to arrange them in such a manner as to make their practical application a matter of easy attainment. I have, also, excluded everything of a technical nature, and have, in many instances, not scrupled to use a phraseology different from that usually employed by writers on horticulture. In adopting this course, my object has been to render the work more generally useful, and especially so to the more humble part of the rural population, by enabling them to avail themselves without difficulty of the directions contained in it, and thereby the more readily to induce them to turn their attention to the cultivation of a plant which is capable of adding to their comforts and increasing their enjoyments in a much greater degree than has been hitherto supposed.

The details of many operations relative to the culture of the vine, that have been heretofore inserted in works on gardening,

have been excluded in the present work, for the simple, and I trust satisfactory reason, that the operations themselves, when submitted to the test of experience, have been found either of uncertain issue or of very questionable utility.

It remains only to observe, that although the routine of management reccommended in the following pages, is the result of many years' diligent investigation, and of patient observation, and rests therefore on the firm basis of actual experience ; I have no reason to expect, nor do I desire, indeed, that this treatise should be considered as worthy of the patronage of the public, otherwise than in proportion to the value and usefulness of the improvements it is designed to introduce in the culture of that most grateful of all fruit trees, the GRAPE VINE.

Sidlesham, near Chichester,
December 30, 1834.

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TREATISE.

CHAPTER I.

INTRODUCTION.

The Grape Vine, VITIS VINIFERA. Class and order, PENTANDRIA MONOGYNIA of Linnæus.

"The grape vine is a trailing, deciduous, hardy shrub, with a twisted irregular stem and long flexible branches, decumbent, like those of the bramble, or supporting themselves when near other trees by means of tendrils, like the pea. The leaves are large, lobed, entire, or serrated and downy, or smooth; green in summer, but when mature, those of varieties in which the predominating color is red, constantly change to, or are tinged with, some shade of that color; and those of white, green, or yellow grapes, as constantly change to a yellow, and are never in the least tinged either with purple, red, or scarlet. The breadth of the leaves varies from five to seven or ten inches, and the length of the footstalks from four to eight inches. The flowers are produced on the shoots of the same year, which shoots generally proceed from those of the year preceding; they are in form of a raceme, of a greenish-white color, and fragrant odor, appearing in the open air in this country in June; and the fruit, which is of the berry kind, attains such a maturity as the season and situ-

ation admit, by the middle or end of September. The berry or grape is generally globular, but often ovate, oval, oblong, or finger-shaped; the colors green, white, red, yellow, amber, and black, or a variegation of two or more of these colors. The skin is smooth, the pulp and juice of a dulcet, poignant, elevated, generous flavor. Every berry ought to enclose five small heart or pear-shaped stones; though, as some generally fail, they have seldom more than three, and some varieties as they attain a certain age, as the ascalon, or sultana raisin, none. The weight of a berry depends not only on its size, but on the thickness of its skin, and texture of the flesh, the lightest being the thin-skinned and juicy sorts, as the sweetwater or muscadine."—*Loudon's Encyclopædia of Gardening.*

Of all the productions of the vegetable world, which the skill and ingenuity of man have rendered conducive to his comfort, and to the enlargement of the sphere of his enjoyments and the increase of his pleasurable gratifications, THE VINE stands forward as the most pre-eminently conspicuous. Its quickness of growth—the great age to which it will live; so great indeed as to be unknown,—its almost total exemption from all those adverse contingences which blight and diminish the produce of other fruit-bearing trees,—its astonishing vegetative powers,—its wonderful fertility,—and its delicious fruit, applicable to so many purposes, and agreeable to all palates, in all its varied shapes, combine to mark it out as one of the greatest blessings bestowed by Providence to promote the comfort and enjoyment of the human race.

From the remotest records of antiquity, the vine has been celebrated in all ages as the type of plenty and the symbol of happiness. The pages of Scripture abound with allusions to the fertility of the vine

as emblamatical of prosperity ; and it is emphatically declared, in describing the peaceful and flourishing state of the kingdom of Israel during the reign of Solomon, that "Judah and Israel dwelt safely, every man under his vine and under his fig-tree, from Dan even to Beersheba." The source of enjoyment thus mentioned to record the happy state of the Jewish nation, may be, with reference to the vine, literally possessed by the greater portion of the inhabitants of this island.

The native country of the vine is generally considered to be Persia, but it has been found wild in America, and is now become naturalized in all the temperate regions of the world. In the northern hemisphere, it forms an important branch of rural economy from the 21st to the 51st parallel of latitude, and by an improved method of culture, very fine grapes may be annually grown on the surface of walls, in the open air, as far north as the 54th parallel, and even beyond that in favorable seasons.

The vine is supposed to have been introduced into Britain at the commencement of the Christian era; and history amply proves, that for a long series of ages, vineyards were very common in the southern parts of this island, and that the quantity of wine produced from them was so great as to be considered one of the staple products of the land. From some cause or other, however, they have fallen into general neglect, although good grapes might be grown on vines, trained as espaliers, or in the same manner as in the vinyards abroad, from which excellent wine could be made at a cost that would not exceed that of moderately strong beer. Why vineyards should have so completely disappeared, it is difficult to say, since there are many thousands of acres of poor land that are of little value in an agricultural point of view, but on which vines would flourish and produce abun-

dant crops of grapes, and yield thereby a most profitable return.

Vines are now cultivated in this country only against walls, upon the roofs of buildings, and under glass. The expense attending the growing of grapes under glass, is such, however, as obviously to place that method out of the reach of the mass of people; and vineyard culture, now it has fallen into disuse, is perhaps considered so much in the light of a commercial speculation, that those who have the means of practicing it, are deterred from employing them, from an apprehension that the risk and uncertainty attending it would prove more than sufficient to counterbalance its advantages. But the cultivation of vines on open walls being free from these and all other objections, presents an advantageous method of producing grapes, which may be embraced by every person who has at his command a few square feet of the surface of a wall. This mode of culture indeed ,offers to the possessors of houses, buildings, and walled gardens, and even to the most humble cottager, ample means of procuring with the greatest certainty an abundant supply of this most valuable fruit. It is not too much to assert, that the surface of the walls of every cottage of a medium size, that is applicable to the training of vines, is capable of producing annually as many grapes as would be worth half the amount of its rental. Every square foot of the surface of a wall may in a short space of time be covered with bearing wood, sufficient to produce on an average a pound weight of grapes, and I have frequently grown double that quantity on the same extent of surface.

From this it will be seen how valuable the surfaces of walls are, and what advantages are lost by those who suffer any portion of them to remain va-

cant. Nor must it be supposed, that a single vine requires for its training a large portion of walling. That it does, I am aware, is a very common notion, but it is a very erroneous one, and one that has no doubt arisen from the universally defective method of pruning and managing that plant; whereby the wood is suffered, and indeed encouraged to extend itself most disproportionately beyond the capability of its fruit-bearing powers. I scarcely ever allot more than from forty to fifty square feet of surface for one vine, and unless the soil and situation be very superior indeed, a single vine will require a space of time not less than twenty years at least, before it will possess a sufficient degree of strength to enable it to mature annually, a greater quantity of grapes than can be trained on the last mentioned extent of surface. On a wall only twenty-five inches in height, and eighteen feet in length, I have for years trained a vine that is a perfect picture of fertility, the whole surface of the wall being every year literally covered with fine grapes close down to the very stem of the plant. It will thus be seen, that small detached portions and vacant spaces of the surface of walls, which, in innumerable instances, are deemed of no value, and are therefore neglected, may be turned to a most beneficial account in the production of the fruit of the vine.

And with reference to the importance of the culture of the vine, as affording a most valuable and highly esteemed fruit, it deserves especial remark, that for the making of wine, not only are ripened grapes applicable to that purpose, but from the leaves, tendrils, and young shoots of vines, and also from unripe or immature grapes, very fine wine may be made, differing in no respect from many sorts of wines imported from abroad, as the following extract from Dr. Macculloch's "Remarks on the Art of making Wine," will sufficiently show.

"Chemical examination has proved that the young shoots, the tendrils, and the leaves of the vine, possess properties and contain substances exactly similar to the crude fruit. It was no unnatural conclusion that they might equally be used for the purposes of making wine. Experiments were accordingly instituted in France for this purpose, and they have been repeated here with success. From vine leaves, water, and sugar, wines have been thus produced in no respect differing from the produce of the immature fruit, and consequently resembling wines of foreign growth."

Here, then, is a most important advantage resulting from the culture of the vine, and one indeed that is little inferior to that which is derived from the production of the ripened fruit itself. And in order that it may be properly estimated, it must be borne in mind, that throughout the growing season, the superabundant foliage of a vine, which consists chiefly of the extremities of the shoots, and the tendrils, is so great as to require to be plucked off once in every seven days, if not oftener. It is further stated in the above mentioned work, that from forty to fifty pounds weight of leaves, &c., will produce about ten gallons of wine.

Now, every hundred square feet of the surface of a wall when covered with the foliage of vines in vigorous growth, will yield on an average every week, from the middle of May to the first of August, two pounds weight of excess of foliage. Allowing, therefore the surface of the walls of a common-sized cottage to contain five hundred square feet, on which vines could be trained, it appears, that during the eleven weeks above-mentioned, they would yield a sufficient quantity of foliage to produce upwards of twenty gallons of wine, which could be made for the mere cost of the sugar!

Again, there would be a considerable quantity of foliage to spare during the remaining months of August and September, to which must be added the excess in the number of bunches of green fruit, which require cutting off after the berries are set, in order to avoid overcropping the vines, and which sometimes amount to a great number; and also the berries that are cut out in the thinning of the bunches, the weight of which is always considerable; and these being added to the former, would, at the most moderate calculation, yield, in the whole, thirty gallons of wine, thus produced from the superabundant foliage and green fruit of vines trained on the surface of a cottage! Bearing in mind, therefore, these important facts which cannot be controverted, it will, I think, be readily acknowledged, that too great a degree of importance can scarcely be attached to the cultivation of the vine.

The management of this plant is in itself, also, one of the most pleasing and most interesting branches of horticultural practice. And it may with truth be asserted, that of all the occupations that can be resorted to for the purposes of recreation, those connected with the garden are the most delightful. From these, indeed, spring many of the most elegant enjoyments of life, and the exercise of them is at once a source of health, of contentment, and of unalloyed and tranquilizing pleasure. So congenial to our ideas of happiness is the recreation afforded by a garden, that there is scarcely any one to whom the possession of it is not an object of strong desire.

Yet to avery numerousclass of persons, the inhabitants of towns, this source of enjoyment is, in a great measure cut off.

The vine, however, can be cultivated equally as well in a town as in the country, and in very many

instances the means for that purpose are possessed in a much greater degree than in the country. The immense accumulation of buildings in towns, and their suburban districts, and also those of the metropolis itself, present an astonishing extent of surface of walling, well calculated to ripen the fruit of the vine. The only obstacle to the growth of that plant in towns is the impurity of the atmosphere; but though this impediment is sufficiently formidable certainly, it exists only in the heart of London, and its dense and crowded districts, and in those of other large towns.

I am persuaded, therefore, that, if the method of cultivating the vine on correct principles, and the certainty which, under proper management, never fails to attend the production of its fruit, were more generally known, its propagation and culture would increase both in town and country to an extent that at present can scarcely be conceived.

It is for the purpose of diffusing a mode of cultivating this valuable plant, which is more definite and simple in its nature than any that has hitherto been promulgated, and by which the quantity of its fruit may be prodigiously increased, and the flavor greatly improved, that the following pages have been written. It is hoped that the whole management of the vine is therein made sufficiently clear to enable every person who possesses facilities for the growing of grapes, to employ them in the most advantageous manner in the production of this highly esteemed fruit.

CHAPTER II.

OBSERVATIONS ON THE PRESENT METHOD OF CULTIVATING GRAPE VINES ON OPEN WALLS.

THERE is, I believe, no branch of practical horticulture, which the possessors of gardens are so deficient in, as in that which embraces the culture of the grape vine; and yet, singular as it may appear, there is no fruit tree of any description that grows in this country, that can be depended upon with such certainty for a full crop, or that will yield so ample a return, as a vine judiciously cultivated on the open wall.

Let any person in the month of September, make a tour of inspection through the southern counties of England, in which nearly every cottage may be seen with a grape vine trained on its walls. Let him stop at intervals in his journey and select any number of vines for examination, and carefully estimate the weight of fruit growing on each, and the extent of walling occupied in producing that fruit, and having calculated the average weight grown on every square foot of walling, let him then be told, which he may be with truth, that at least *five* times the quantity of grapes of superior flavor might be annually produced on the same extent of surface. Let him also select any given district, and estimate the number of superficial feet of walling which the buildings in that district contain, and on which nothing whatever is grown, or at least nothing of any value, and which might at a trifling cost of time and trouble be annually covered with fine crops of grapes, and he will

find to his astonishment, that for every square foot on which vines are trained, there are at least *twenty* square feet that are either entirely vacant or occupied in a useless manner. If he then sum up his calculations, the result will show, that, for every pound of grapes that is now grown, not less than a *hundred* pounds might be annually produced on the existing surface of walling, without the addition of a single square foot! Nor let it be supposed that this estimate is made hypothetically; on the contrary, it is the result of actual inspection and careful observation, and is considerably within the mark as to the quantity of grapes that might be annually grown. Every moderate-sized dwelling house having a garden and a little walling attached to it, may with ease be made to produce yearly a quarter of a ton weight of grapes, leaving a sufficient portion of its surface for the production of other fruit.

It is difficult to account for the indifference which has hitherto been manifested towards the propagation of the vine, or to assign sufficient reasons why a fruit so universally esteemed as the grape, should have remained stationary in respect to any improvement in its mode of culture.

I suspect, however, that the force of custom and example will be found amongst the chief operating causes. Scarcely any person, when planting vines against his premises, ever thinks of setting apart for any one to be trained on a less space of walling than a hundred and fifty, or two hundred square feet, seeing that the universal practice is to suffer a single vine to cover as quickly as possible the entire surface of one side of a house or building, or a large portion of that of a garden wall. And this seems to be done under the idea, that the more wood there is in a vine, the more grapes it will produce, or that the one will

be in proportion to the other. It happens, however, that the fact is precisely the reverse. If a vine be suffered to make a large quantity of wood, it will bear but little fruit; if it produce good crops of fruit, it will make but little wood; the one checks the other. To permit a vine therefore to make a great quantity of wood, under the idea of getting thereby a great quantity of grapes, is completely grasping at the substance and catching the shadow.

Another reason why the method of cultivating the vine on open walls has remained stationary, may be found in the fact, that in the gardens of the rich, where professed gardners are kept, grapes on vines of this description are but seldom grown to any extent, a sufficient quantity for the table being brought to perfection under glass. Hence, one of the principal sources from which improved modes of culture are in general derived, is thus closed, and the routine of management of this most valuable fruit thereby consigned to the chances of empirical practice.

The grand parent error which prevails universally in the cultivation of the vine on walls, lies in the method of pruning usually adopted, and this is undoubtedly the consequence of the nature of the plant and its peculiar characteristics being in general but little understood. The immense quantity of wood which a vine annually produces, and the force with which its sap flows, causing its most vigorous shoots to be formed at the extremities, render it necessary, in order to keep the plant in a good bearing condition, and its branches within a reasonable distance of its stem, that the pruning-knife should be used to a far greater extent than is ever practised on any other description of fruit-tree whatever. The most severe manner, indeed, in which that instrument is at any time applied to other trees, is as nothing when compared with that required by the vine.

In the course of the growing season, a vine in a healthy condition will make a quantity of bearing wood sufficient to produce ten times as much fruit as it can bring to maturity. When this fact is considered in connection with another, namely, that the wood which bears fruit one year never bears any afterwards, and is therefore of no further use in that respect, it will easily be seen to what a surprising extent the pruning-knife must be used, to get rid of the superabundant wood which the plant annually produces. But nine parts out of ten of the current year's shoots, and all those of the preceding year, if possible, to be cut off and thrown away, is apparently so much beyond all reasonable proportion, and the rules usually observed in pruning other fruit trees, that few persons ever possess the courage to attempt it. And herein, as remarked before, lies the capital error in the common method of managing the vine.

A vine in the third or fourth year of its growth, will in general show a few bunches of grapes, and these are usually suffered to remain and ripen, instead of being plucked off as soon as they appear, having been produced before the plant has sufficient strength to mature them without injury to its constitution. Although the quantity be small, it inflicts a severe blow on the vital energies of the vine, from the exhausting nature of the process of maturation. At the proper season the pruning-knife is applied, but the operator being in perfect ignorance as to whether the plant has sufficient strength to ripen any fruit or not in the following year, looks at the young wood, and seeing four or five good strong shoots, cuts them back to as many buds each, leaving perhaps twenty in the whole. Summer comes, and the vine having been seriously crippled by the premature ripening of fruit in the preceding year, and having now twenty shoots

to supply with nourishment instead of two or three, the sap is so diminished in quantity, and distributed also through so many channels, that it is incapable of forming an inch of really good bearing wood. The shoots protrude, and though small, produce a great mass of foliage; the evaporation from this being far too great for its loss to be supplied by the roots, a languid circulation of the juices of the plant takes place, and it receives thereby a most serious check in its growth. The result is, that, at the end of the season, no shoots larger in size than that of a small wooden skewer are to be seen except at the extremities.

The proper season arriving, the vine is again pruned, and again eight or ten times as many buds are retained as the plant can nourish. The same disproportionate mass of foliage follows of course, and the same exhausting effects are produced on the vital powers of the plant. No bearing shoots are formed except at the extremities, and these being retained at the autumnal pruning, old blank wood begins rapidly to cover the surface of the wall. The method of pruning also, being in general what is called the spurring method, tends more than any other to the permanent retention of old wood. And thus, the vine commences its fruit-bearing life under the most adverse circumstances.

The same mode of culture being followed in yearly succession, the vine quickly spreads over its allotted space of walling, exceeding perhaps two hundred or even three hundred superficial feet. It then contains a vast number of long and useless limbs, on which may be seen scores of excrescences dignified with the name of spurs, producing in the growing season a superabundance of foliage, with but little fruit, and that of an inferior description, and requir-

ing in its management a tenfold portion of time and trouble beyond what would be necessary under a proper mode of culture.

To these characteristics of the usual method of managing a vine, may be added two others; namely, that of suffering the stem and principal branches to be covered with several years' accumulation of decayed layers of bark, and of continually digging the border in which the roots run, and cropping it with vegetables even close up to the very stem.

This brief description of the method of cultivating vines on open walls, will apply, I believe, to ninety-nine out of every hundred throughout the country. And it may be remarked of it, that during the first year of the plant having been suffered prematurely to ripen fruit, and throughout every successive year afterwards, not a single point of culture has been practiced but what may be described as most erroneous. Every step taken has been apparently for the purpose of rearing a superstructure of old barren wood, rather than the production of abundant crops of fine-flavored fruit.

Can it be a matter of surprise, therefore, that under such a mode of culture, grapes grown on the open wall do not in general attain to a higher degree of perfection?

CHAPTER III.

ON THE CAPABILITY AND EXTENT OF THE FRUIT-BEARING POWERS OF THE VINE.

There is not a single point of culure in the whole routine of the management of a vine, the knowledge

of which is of so much importance as that which enables the cultivator to ascertain with precision the greatest quantity of fruit he can annually extract from it without checking its growth or injuring its vital powers. The operation of pruning, if it be not guided by this, is an operation performed perfectly at random, and every inch of bearing wood either cut or retained under such circumstances, is done in utter ignorance of the consequences, whether they will ultimately prove injurious or beneficial to the health and fertility of the plant. And yet, necessary as is this knowledge, and without the guidance of which in pruning, neither good flavored grapes nor good crops can with *certainty* be *annually* obtained, all the rules hitherto laid down for the pruning of vines, have been promulgated, unaccompanied with the slightest instruction to lead the pruner to a knowledge of this most valuable point of culture.

Such, however, is the importance of proportioning the quantity of fruit to be matured to the capability of the plant, that in Miller's Gardener's Dictionary it is stated, in reference to the cultivation of the vine in foreign countries, "that when gentlemen abroad let out vineyards to vignerons, there is always a clause inserted in their leases, to direct how many shoots shall be left upon each vine, and the number of eyes to which the branches must be shortened; because were not the vignerons thus tied down, they would overbear their vines, so that in a few years they would exhaust their roots, and render them so weak as not to be recovered again in several years, and their wine would be so bad as to bring a disreputation on the vineyard, to the great loss of the proprietor."

Here, then, is a distinct recognition of the fact, that the flavor of grapes and the vital energies of vines are materially affected by overcropping; and to that

restrain the lessees of vineyards in foreign countries from practicing so injurious a course of culture, the number of eyes are actually limited, and even made the subject of special contract. Now if it be necessary to observe such a rule in countries that are congenial to the growth of the vine, and where, from its forming an important branch of rural economy, it may be reasonably presumed the true nature of the plant is well understood, how much more so must it be in the latitude of Great Britain, where, from the deficiency of solar heat, and the variableness of the climate, a greater portion of the vital energy of the vine is put in requisition to ripen the fruit?

And yet, who has ever seen, in the English practice of pruning vines, any rule observed of the above-mentioned nature? In short, the common method of pruning vines on open walls is the most random operation imaginable.

In very warm summers, the juices of a vine plant are more highly elaborated than usual, the sap being inspissated, or thickened in a greater degree by the increase of solar heat, in consequence of which, it is rendered more productive of flower-buds than leaf-buds. Shoots that are considerably less in size than those which bear fruit in ordinary summers, will, after being ripened in such a summer, produce fine grapes in the following season; it is next to impossible, therefore, to prune a vine when all the shoots are thus well ripened, so as not to bear a good crop of fruit in the ensuing year. Indeed, a person blindfolded may then take a common sickle, and chop away at a vine right and left, and if he chance to leave any young wood at all remaining, that wood will produce fruit, because nearly every bud formed in such a summer becomes a fruit-bud. In the following year, almost every vine, however injudiciously managed,

will be seen loaded with fruit, and the year is then called a "grape year." In such years I have frequently seen vines groaning as it were beneath their prodigious number of bunches, and have on such occasions invariably pointed out to the owners of them the certainty of the plants being crippled for many years to come, if the whole quantity produced were suffered to remain and ripen; but no representation of this sort made by me to any one, whether gardener or otherwise, ever had in any instance the effect of causing the excess in the quantity to be reduced, even by a single bunch. So deeply rooted seems to be the belief that because a vine *shews* a great number of bunches of grapes, it can therefore *ripen* them.

Many years ago, I was led to consider the necessity of ascertaining the extent of the fruit-bearing powers of vines, in order to *ensure* their successful culture, by founding thereon a system of pruning which should be simple in practice and certain in its effects, being based on the principle of proportioning the quantity of bearing-wood retained at the autumnal pruning, to the capability of their powers of maturation. For the attainment of that object, therefore, I commenced a series of experiments on a great number of vines of various ages and sorts, and trained on every variety of aspect, south of and including the eastern and western points of the horizon.

Knowing by previous experience that it was possible to load a vine with such a quantity of fruit as would completely deprive it of life in its endeavors to mature it, and assuming that the circumference of the stem of the plant would form a true index to its vital powers, unless these had been injured by overbearing, several vines remarkably vigorous in growth, and which had been for three years previously closely pruned, were in the first place selected for trial,

for the purpose of discovering that quantity. That point having been ascertained, it was intended then to select in every succeeding year a fresh set of vines, and to reduce annually the weight of fruit to be borne by each of them until the actual quantity which any vine, in proportion to the circumference of its stem, can perfectly mature without injury to its vital powers, was correctly ascertained.

In accordance with this intention, the vines first selected as above-mentioned, were pruned in the autumn of 1825, and as much bearing-wood retained as was supposed would produce sufficient fruit either to kill them or cripple them for many years to come. The number of buds retained on each vine, and the circumference of its stem were carefully registered; the ensuing summer of 1826, afforded a remarkably fine vintage, and was therefore a highly favorable year for the trial.

To describe the results, which, with little variation, were the same in all, one vine may be advantageously selected. This was a white muscadine, in the eighth year of its age, and, like all the rest, in the highest bearing condition possible. It produced in the following spring an abundant supply of vigorous bearing shoots, and shewed seventy-eight bunches of fine grapes, the produce of twenty-nine buds, retained on two horizontal right and left shoots. As the season advanced, the shoots extended themselves rapidly, the bunches of fruit increased in size, and the vine thrived as well as usual, seemingly quite unconscious of the task it shortly had to perform. Blossoming being over, and the fruit set, the trial of strength commenced. On the first of July, many of the bunches measured eleven inches from the shoulders to the extremities, and when matured, would have weighed a pound and a half each. They hung

close together, forming, as far as they extended on the wall, an entire and compact mass of grapes, the weight of which, if ripened, would have exceeded sixty pounds. The middle of that month arrived, and the berries had only reached the size of small peas, while those on other vines, not subjected to any such trial, were full grown, and had commenced the stoning process. On the first of August, no perceptible increase of size in the berries had taken place, and the vine began to show strong symptoms of exhaustion. About the middle of that month the foliage assumed a withering appearance, and on the first of September the vegetation of the plant was almost at a stand. The shoots ceased to grow, the fruit and foliage were in a prostrate condition, and the vital energies of the vine appeared unable to supply the daily increasing demand for nourishment. Throughout that month it continued in a pitiable condition, and though a valuable plant, it was nevertheless suffered to take its course as well as all the others, in order that the trial might be decisive. About the first of October, the greater part of the berries having grown as large as middling-sized peas, those on the shoulders of some of the bunches began to show symptoms of ripening, by becoming a little transparent; and at the same time, the berries at the extremities of the bunches began to shrivel. As the month advanced, the ripening process proceeded slowly, but the shriveling increased rapidly. Towards the latter end of October the trial was over, and the experiment complete; on many entire bunches every berry had shriveled, and in no bunch had the process of maturation proceeded farther down than the shoulders. The whole crop was gathered about the first of November, and the ripened portions being put together, weighed nine pounds and a half. Not one of these ripened berries, however, was more than half the usual size,

and in point of flavor not to be compared to others of the same sort ripened at least six weeks previously.

The vine was pruned immediately and cut almost to a stump, to give it every chance of recovering from the blow it had received. But in the following spring, not a single bud unfolded till nearly a month after the usual time, and at the close of the season, the largest shoot was only twenty-six inches in length, and no larger than a packing needle, although in the previous year the vine had emitted very vigorous shoots twenty-five feet in length. It has been pruned very closely every year since, and has in consequence gradually acquired strength, but although eight years have elapsed since the experiment was made, it has not yet recovered its former vigor. The effects produced on the other vines have ultimately proved equally injurious, not one of them having yet acquired anything like the same degree of health which it then possessed.

The result of these experiments was decisive as to the proportion of fruit having very greatly exceeded the strength of the vines, some of which, no doubt, would have died from the effects of their own fertility, if they had not previously been in an exceedingly vigorous state.

In the following year, 1827, another set of vines was selected for a similar trial of strength, and only half as much fruit retained on each as on those of the preceding year. This quantity, however, proved far too great, as the grapes only partially ripened and the vines were completely crippled for several years afterwards.

In the three following years, 1828, 1829, and 1830, fresh vines were annually selected for similar experiments, and the weight of fruit reduced every successive year, until, in 1830, the object in view seemed to be attained, the grapes having all been perfectly

matured, and the vital powers of the vines (which has subsequently been proved) not in the least encroached upon.

Other vines of different ages were also annually selected during the above-mentioned period from 1826 to 1830, and as much fruit assigned to each of them to ripen, as was then thought equal to their powers of maturation. The weight so assigned has since proved to have been pretty near the correct proportion.

The results of all these experiments were carefully registered from year to year, and at the close of 1830, the whole being accurately examined, it appeared clearly that the capability of the vines to mature fruit was in direct proportion to the circumference of their respective stems.

Simultaneously also with these experiments, several young vines were annually set apart for the purpose of discovering the effects of early bearing on their subsequent growth, and of ascertaining the size which the stem of a young vine must attain, before it is capable of maturing any fruit without injury to its vital powers. From this source much valuable information was obtained, and the fact also established that young vines will always show fruit before they can ripen it without injuring their future growth and fertility.

From the whole of these experiments, therefore, a scale was then constructed in accordance with their results, of the weight of fruit which any vine that has not been overcropped, will bring to the highest perfection which the climate will permit without impairing its vital powers, which was *the point of knowledge sought to be obtained.*

Agreeably to this scale, which is inserted below, I pruned in the winter of 1830, nearly forty vines of different sorts, and of various ages, leaving in each no

greater number of buds than appeared on an average calculation to be sufficient to produce as much fruit as the vine was allowed to mature. In the following summer, as soon as the berries were set, the number of bunches required to produce the given weight of fruit was selected to remain, and the excess immediately cut off. I have strictly adhered to this plan ever since, and it has enabled me to produce finer grapes than I have ever seen or heard of being grown on the open wall in this country. And so prolific does every vine become from the hard pruning which an adherence to this scale compels, that I have frequently to cut off at the proper period in the summer, as much as one-half, and sometimes even three-fourths of the fruit which many of the vines shew, in order to reduce it to its proper quantity.

Vines thus pruned, with the bearing wood annually adjusted to their respective powers of maturation, being kept within a small compass on the surface of the wall, are easily managed throughout the summer. They never fail to produce an abundant supply of the finest description of bearing shoots within a reasonable distance of their stems, and always bring their fruit to the highest degree of perfection which the climate will permit, with a certainty which has never yet attended the production of grapes on the open wall in this country.

Scale of the greatest quantity of grapes which any vine can perfectly mature, in proportion to the circumference of its stem, measured just above the ground.

Cir.		lbs.	Cir.		lbs.
3	Inches	5	7	Inches	45
3½	do.	10	7½	do.	50
4	do.	15	8	do.	55
4½	do.	20	8½	do.	60
5	do.	25	9	do.	65
5½	do.	30	9½	do.	70
6	do.	35	10	do.	75
6½	do.	40			

It will be seen, that if 2 1-2 inches be deducted from the circumference of the stem of any vine, the capability of it will be equal to the maturation of ten pounds of grapes for every remaining inch of girth. The proportionate quantity for fractional parts of an inch may be easily calculated.

The circumference of the largest stem in this scale is ten inches, beyond which size I have had no opportunity of selecting a sufficient number of vines to enable me to carry the experiments further in a satisfactory manner. I have, however, at various times, examined a great many vines above that size, and have estimated the weight of their respective crops at the vintage, and when the whole crop borne by any vine has been perfectly matured, and a good supply of fine vigorous shoots for future bearing wood produced simultaneously in the current year, the result has uniformly been that the weight of fruit has not exceeded the proportion mentioned in the scale. I think it not unreasonable, therefore, to conclude that the same proportionate quantity will apply to every vine, whatever may be the girth of its stem.

No vine is taken cognizance of until its stem measures three inches in girth, as under that size vines ought never to be suffered to ripen any fruit. This is a rule that should be strictly adhered to in the management of young vines, for it may be safely asserted, that for every pound weight of grapes extracted from a vine before it has grown to that size, ten pounds will be lost during the next five years, independently of the very severe check which is given to its growth by premature bearing. But by husbanding its strength till its roots have multiplied sufficiently to provide a full supply of nourishment without suffering from exhaustion, the plant commences its fruit-bearing life with a degree of vigor which lays a sure foundation for its future prosperity.

It may be remarked that, in general, vines are suffered to bear a much greater quantity of grapes than the above scale represents, but in all such cases it will be found that they are not *perfectly* ripened. The grand desideratum in grapes when used as table fruit is *flavor*, and this is entirely regulated by the circumstances under which they are ripened. One of those circumstances is the quantity of grapes suffered to remain and ripen as compared with the strength of the vines. The respective quantities mentioned in the scale are such as every vine of the given girth of stem can perfectly mature, but if these be exceeded, the flavor will immediately begin to diminish, and the vine may then be said to be overcropped. On the other hand, although a less quantity of grapes may be matured by a vine than the proportion represented in the scale, the flavor will not thereby be increased, in which case the vine will be undercropped. This, however, very seldom happens; but to go beyond the true bearing point, and to overcrop a vine whenever the quantity of fruit shewn will admit of it, is of almost universal occurrence, not only on vines trained on the open wall, but with those under glass also. It is impossible to place this injurious practice in too prominent a point of view, for it is the prolific parent of almost every evil that can befal a vine, and it is really so general that scarcely one vine in ten thousand escapes it.

Although, therefore, the proportionate quantities mentioned in the scale are much less than vines are frequently permitted to bear, they may be regarded as a close approximation to the greatest weight of fruit which can be borne so as to be brought to the highest degree of maturation which the climate will permit. There may be a little increase in the powers of maturation of vines, when trained on very warm as-

pects, but I have never found it to prevail to any extent, nor to be sufficiently uniform in its occurrence, to justify any variation in the proportions laid down in the scale. Some sorts of vines, also, are constitutionally disposed to *show* more fruit than other sorts, but the capability to *mature* the fruit is pretty nearly equal in all. It may be further remarked, that if a vine during any season be undercropped, the deficiency may be partly made good the following year, by causing it to bear a considerable portion more in addition to its allotted quantity. This results from the sap not having all been expended in ripening the fruit. It has in consequence accumulated, and the plant is thereby enabled to mature a greater weight of fruit the ensuing season, than it otherwise could do from the sap generated in the current year.

The manner in which it is intended that this scale should be practically applied, is to measure the stem of a vine at the autumnal pruning, and to retain no more good well-ripened fruit buds than is supposed necessary to produce the given weight of fruit which corresponds to its girth. And if there should be any excess above that quantity in the ensuing summer, the crop must be reduced to the given weight by cutting off a sufficient number of bunches as soon as the blossoming is over and the fruit set, as the weight of it when ripened may then be easily estimated.

With respect to the number of buds that are necessary to be left at the autumnal pruning to produce any given weight of fruit, I have found it to be a good general rule and applicable to all those sorts of grapes usually cultivated on the open wall, to consider every bud (rejecting the two bottom ones on each shoot) as equal to the production of half a pound weight of fruit;—that is, if the stem of a vine measure five inches in girth, its capability is equal to the

maturation of twenty-five pounds weight of grapes, and therefore the number of buds to remain after pruning will be fifty. This proportion would in general be too great, even in the shyest bearing sorts, but as accidents frequently happen to the bunches during their early growth, and as there will in general be some buds that will not burst, provision must be made against these casualties by reserving a greater number of buds than would otherwise be required. The proportionate number therefore, above-mentioned, I have found to answer well, and to be sufficient to meet all contingences.

It is necessary to observe, that all the experiments on which the scale is founded, were made on vines growing in 50° 46′ north latitude.

CHAPTER IV.

ON ASPECT.

A good aspect, which is of prime importance in perfecting the fruit of the vine, may be termed, when considered in reference to the surface of walls, an amelioration of climate; and soil and climate are the two grand causes of all the differences which appear in the productions of the earth.

The warmer the aspect, the greater perfection does the grape attain in our climate, provided all other circumstances are alike; and if the greatest quantity of the sun's rays shining on the surface of a wall were alone to be considered as constituting the best aspect, there would of course be no difficulty in naming a due southern one as better than any other.

But *warmth* alone is not sufficient; *shelter* is equally necessary. There is a strong counteracting agent, which as its effects fall more or less on any surface of walling on which vines are trained, proportionately injures them and retards their growth and the maturation of their fruit. That agent is the wind.

There is no period in the growth of a vine, from the moment of its being planted as a cutting or otherwise to the extremity of its existence, in which any movement of the air that may properly be called *wind* will not have a greater or less pernicious effect on its well-being. The perspiration of a vine is so great, principally through the medium of its large fine leaves, with their broad surfaces disposed in such a manner as to enjoy the full effects of the solar and atmospherical influences, that an extraordinary supply of sap is requirrd to rise every instant of time throughout the growing season to enable it to recruit its loss. On the foliage of a plant, performing some of its most important functions in such a manner, if a strong wind should blow at any time for the space only of a few hours, the flow of sap is seriously checked, evaporation proceeds at a most exhausting rate, and the leaves and young shoots being speedily emptied of the moisture accumulated in their cells and vessels, become rigid, and their pores completely closed. The vegetative powers of the plant being thus prostrated, cannot resume their functions till after the wind has ceased several hours or even days, according to its violence and duration.

I have made repeated observations on the growth of the leading shoots of vines in the height of the growing season, and have many times noted the fact that during the space of twenty-four hours, when the wind has blown briskly, the shoots exposed to its influence have not perceptibly grown at all, while short-

ly afterwards, the wind having entirely sunk away, the same shoots have grown upwards of three inches in the same space of time, the temperature of the air in a sheltered situation being alike during each period.

And if two young vines be planted by the side of each other against a wall exposed to the north, for the purpose of trying the experiment by excluding the influence of the sun's rays, and one be kept nailed to the wall every five or six inches of its growth throughout the summer, and the other be suffered to be blown about without any such protection, the former will be found at the end of the season, to have grown in the size and extent of its shoots, three or four times as much as the latter. Nothing, indeed, can be more tender or less calculated to withstand the effects of the wind than the extremities of the young shoots of a vine, which, from being extremely porous, are almost as susceptible of its withering influence as the sensitive plant is of the touch of the hand.

Many instances might be circumstantially detailed of the injurious effects of the wind upon established vines during their summer's growth; two, however, of recent occurrence will perhaps suffice.

On the eleventh of June, 1833, a strong wind sprang up early in the morning from the west, and increased in force till noon, when it blew quite a gale, and continued so to do throughout the day. It slackened a little during the night and gradually decreased in violence the next day, dying entirely away by the evening. The effects of this wind on a vine of the white muscadine sort trained on a wall having a western aspect were carefully observed. It had on a full crop of fruit and a good supply of fine bearing shoots, and was altogether in a most thriving condi-

tion. Such, however, were the injurious effects of the wind in dissipating all the accumulated secretions of the foliage and then closing almost hermetically its pores, and thereby totally deranging the vital functions of the plant, that, although in the height of the growing season, not the slightest appearance of renewed vegetation could be discerned in any part of its leaves, shoots, or fruit, until the third day of July, or twenty-two days afterwards. It never produced another inch of good bearing wood throughout the remainder of the season, but lingered in a very weak and sickly condition; and the fruit, which had been previously estimated at ninety pounds weight, did not exceed fifty-five pounds when gathered, and that of a very inferior description in point of flavor and size of berry. Its leaves, also, having been thus crippled, were shed prematurely a month before their natural time, and hence the deficiency in the size and flavor of the grapes.

The other instance, which happened shortly afterwards, is still more decisive. On the 30th of August following, about eight o'clock in the evening, a strong wind began to blow from the south-west, accompanied with heavy rain. At nine it blew violently, and continued so to do until noon the next day. It then slackened, and veering to the north-west, died away some time during the following night.

The full force of this wind fell on a remarkably fine black Hamburgh vine, trained on a wall having a south-south-western aspect, and its effects were therefore proportionately destructive. Many of the principal branches were torn from their fastenings and their extremities swept the ground. The bunches of fruit were knocked about, and portions of them as well as single berries lay scattered on the ground in every direction. On the fruit, however, that sur-

vived the wreck, the effects of the wind were remarkable. It must be stated, that the wall on which the vine is trained is ten feet high, and is so situated, that to the height of about three feet from the ground the wind had but little power over it, its force being broken by an outer wall standing at a little distance off, in front of it. On the lower part of the wall so protected, the grapes not having been much injured, began to change their color and ripen about the twentieth of September, and on the twelfth of October every berry was perfectly matured; while all those that remained on the vine above three feet from the ground, were, on the first of November, as green and as hard as on the thirtieth of August when the high wind occurred. Shortly afterwards these began to change their color, and ultimately ripened tolerably well by the first week in December. Thus solely through the effects of a strong wind, there were to be seen at the same time, on the same branches of this vine, and within nine inches of each other, bunches of grapes, the lowermost of which were perfectly ripe, while the uppermost were quite green and hard, and not within seven weeks of reaching the same state of maturity.

These facts, which might be multiplied indefinitely, sufficiently show the injurious effects of strong winds and the necessity of protecting vines as much as possible from their destructive consequences. Nor must it be supposed that *high* winds are those only which injure the vine. *Every* wind that blows on the foliage of a vine deranges its functions, and thereby retards the growth of the plant and the maturation of its fruit, in a greater or less degree in proportion to its violence and duration.

In the choice of a good aspect, therefore, shelter from high or often recurring winds becomes a prime

consideration; and those aspects that are the least exposed to their effects and that receive a full portion of the solar rays, may accordingly be deemed the best. There are, however, in general, so many local circumstances which affect the warmth and shelter of the surfaces of walls and buildings, that these alone, where they exist, must determine the best aspects for the training of vines. But if there be no such local circumstances to influence the choice of aspect, then I have no hesitation in stating, from experience and observation of the qualities and flavor of the fruit of the different vintages for many years past, that the best aspects in which grapes can be brought to the highest degree of perfection on the open wall that the latitude and climate of the southern parts of England will permit, are those that range from the *eastern* to the *south-eastern*, both inclusive, the last of which, indeed, may be considered the very best.

On walls having any of these aspects, the sun shines with full force in the early part of the morning, at which time there is something highly favorable to vegetation in the influence of his rays. These, darting nearly perpendicularly on the foliage of a vine, while the dew yet remains, and its beautiful crystal drops hang suspended as it were by magic to the angular extremities of the leaves, seem to stimulate the vital energies of the plant in an extraordinary degree, and to excite them to a vigorous exercise of all the important functions appertaining to vegetable life.

The next best aspects are those which follow in succession from *south-east* to *south*. An aspect *due south* is undoubtedly a very good one, but its exposure to those strong winds which so frequently blow from the *south-west* forms a great drawback to its excellence. The remaining aspects are those which range successively from *due south* to *due west*. These

are all good ones, provided they are sheltered, or partially so, from the destructive effects of the high winds above-mentioned. *North* of the *western* point, the maturation of the wood and fruit of the vine becomes uncertain; nevertheless, tolerably good grapes may be grown on the surface of a wall having an aspect not farther *north* than *west* by *north*. There is, however, another aspect that is *north* of the *eastern* point of the horizon, which is a very good one indeed, and that is *east* by *north*. On a wall facing this point, the sun shines till about eleven o'clock in the morning. I have, for many years past, brought several sorts of grapes, including the black Hamburgh, to great perfection in this aspect. North of this point, however, the solar rays are not sufficiently powerful to mature either the wood or fruit of the vine.

CHAPTER V.

ON SOIL.

THE natural soil which is most congenial to the growth of the vine and to the perfection of its fruit in this country, is a light, rich, sandy loam not more than eighteen inches in depth, on a dry bottom of gravel, stones or rocks.

No sub-soil can possess too great a quantity of these materials for the roots of the vine, which run with eagerness into all the clefts, crevices, and openings in which such sub-soils abound. In these dry and warm situations, the fibrous extremities, pushing themselves with the greatest avidity, and continually branching

out in every possible direction, lie secure from that excess of moisture which frequently accumulates in more compact soils; and clinging like ivy round the porous surfaces of their retreats, extract therefrom a species of food more nourishing than that obtained by them under any other circumstances whatever.

One of the principal causes of grapes not ripening well on the open wall in this country, is the great depth of *mould* in which the roots of vines are suffered to run, which, enticing them to penetrate in search of food below the influence of the sun's rays, supplies them with too great a quantity of moisture; vegetation is thereby carried on till late in the summer, in consequence of which the ripening process does not commence till the declination of the sun becomes too rapid to afford a sufficiency of solar heat to perfect the fruit.

To prevent this, the sub-soil should be composed of dry materials. It is almost impossible, indeed, to make a vine border of materials that shall be too dry or porous. It is not mere *earth* that the roots require to come in contact with to induce growth and extension, but *air* also, which is as necessary to them as to the leaves and branches. The excrementitious matter discharged from the roots of a vine is very great, and if this be given out in a soil that is close and adhesive, and through which the action of the solar rays is feeble, the air in the neighborhood of the roots quickly becomes deleterious, and a languid and diseased vegetation immediately follows. But if the roots grow in a soil composed of dry materials, mixed together in such a manner as to possess a series of cavities and interstices into which the sun's rays can enter with freedom and there exert their full power, the air in which the roots perform their functions becomes warmed and purified, they absorb their food in

a medium which dissipates their secretions, and a healthy and vigorous vegetation is the never failing consequence.

The roots of every plant have a particular temperature in which they thrive best, and that which those of the vine delight in most is generated in a greater degree in stony or rocky soils than in any other. This is easily accounted for, from the fact that soils of this description being quickly rendered dry by evaporation, are always free from that excess of moisture which is so injurious to the growth of the vine.

It may hence be inferred, that vines will not flourish in a cold, wet soil, nor in one composed of a stiff, heavy clay. Grapes produced on vines planted in such soils scarcely ever ripen well, and if so, never possess the flavor of those grown on vines planted in a dry soil. Vines may be seen in all parts of the country, the fruit on which looks well during the early part of the season, but when the ripening period arrives, the berries remain green and hard, or otherwise they shrivel and decay. These results are sure to be produced when the roots grow in a soil that is too wet and adhesive, and into which the sun and air cannot freely penetrate.

All borders, therefore, made expressly for the reception of vines, ought to be composed of a sufficient quantity of dry materials, such as *stones; brickbats, broken moderately small; lumps of old mortar; broken pottery; oyster shells, &c. &c.*, to enable the roots to extend themselves freely in their search after food and nourishment; to keep them dry and warm by the free admission of air and solar heat, and to admit of heavy rains passing quickly through, without being retained sufficiently long to saturate the roots, and thereby injure their tender extremities.

In preparing the border, then, the first thing is to secure a dry bottom. If the soil and sub-soil be naturally such as is described above as the most congenial to the growth of the vine, nothing more is required than to trench the ground two spit deep, to clean it well from all weeds and roots, and to make it as fine as possible, and it will then be in a proper state to receive the vines.

But if the sub-soil be not naturally dry, it must be made so by the usual process of draining, which is the basis of every improvement that can be made in the soil. The bottoms of the drains ought, if possible, to be four feet from the surface, and the drains a foot deep; the clear depth of the border will then be three feet. If the soil of this be heavy and of a retentive nature, two thirds of it ought to be taken entirely away, and the remaining portion, which should be the top spit, made very fine. The deficiency should be made good by adding an equal quantity of dry materials of the above-mentioned description, and of the sweepings of a high-road, all of which must be well mixed and incorporated together. If the natural soil of the border be too sandy and light, the same process may be followed, with the exception of the addition of road-sweepings. In lieu of these, should be added a sufficiency of fine mould, collected from mole-hills, which is generally of a rich loamy nature; or of fresh soil from some neighboring meadow or common, which, if well pastured, will prove very fertile; but if neither of these can be procured, the deficiency may be made good from the top spit of a field of good arable land.

And of whatever nature the soil may be in which it is intended to plant vines, it ought to contain at least one third of dry materials of the above-mentioned description.

With respect to the sweepings of roads, I am decidedly of opinion that those obtained from a turnpike road, or from any other high-road kept in a good state of repair by the frequent addition of stones, and on which there is a considerable traffic of horses or other cattle, is the very best compost that can be added to any border intended for the growth of vines. Its component parts, consisting chiefly of sand, gravel, pulverized stones, and the residuum of dung and urine, afford a greater quantity of food, and of a richer and more lasting nature than can be found in any other description of compost that I have seen or heard of being used for that purpose. I have on many occasions opened the borders of vines to examine the directions of their roots, and to discover the particular species of soil which they preferred, and I have uniformly found that when any portion of this compost had been introduced, the fibrous extremities of the roots had pushed themselves into it, and multiplied there in a tenfold degree beyond those in the adjacent soil. I think, therefore, that however rich the soil of a vine border may naturally be, a portion of this compost may be added to it with the greatest advantage. It should be scraped or swept off the road when it is not so wet as to cake together, nor so dry as to be bordering upon dust, but in a moderately dry state betwixt the two extremes. It ought to be mixed with the other components of the border soon after it has been collected from the road, as all its valuable qualities will then be preserved entire.

In putting the materials of the border together, as many whole bones as can possibly be procured should be inserted with them, (in the manner hereafter mentioned in the chapter on manure) and if these cannot be obtained in sufficient abundance, then such other substances as are therein recommended

as manures, may be substituted. It is desirable that the width of the border should not be less than eight feet if local circumstances will permit, but if not, one of less width must suffice. At a convenient distance from the bottom of the wall, a sufficient quantity of stones or gravel, but not of a binding nature, should be laid, to form a path to stand on, in order to perform with cleanness and facility those necessary operations on the vines which are almost daily required throughout the summer.

The border should be perfectly level, or, if a sloping surface cannot be avoided, the descent must be from the wall. No other plant or tree of any description should be intermixed with the vines, or trained against the wall. If other trees be trained on the surface of the wall amongst the vines, the current year's shoots of the latter will be liable to be shaded and impeded in their growth and training, and be thereby deprived of the full advantages of the heat of the wall.

It will also prove very beneficial to the growth and fertility of the vines and to the flavor of the fruit, if the border in which they are planted be never cropped nor digged. The cropping of a vine border is of a highly injurious tendency, for it not only impoverishes the soil, but shades it from the influence of the sun and air, which is a consideration of the very last importance. Solar heat, indeed, is the only thing that this country is deficient in, as it respects the culture of the vine, and there can be no doubt, I think, that if we had but a trifling portion more of it, the southern parts of England would produce grapes on the open wall, equal in point of flavor to those grown in the most auspicious climates. Great care, therefore, ought to be taken, never to intercept or obstruct for a single hour, during any part of the year, the full

and direct operation of the sun and air on the surface of a vine border.

It must also be stated, that after a vine has been planted three or four years, its roots will begin to make their way upwards towards the surface of the border, doubtless attracted by the joint influence of the sun and air. And if the border be not disturbed by cropping or digging, they will come up close to the surface about the ninth or tenth year. In this situation they receive an extraordinary increase of solar heat, the very life and soul of all vegetation; and being, moreover, near the surface, they can be nourished by liquid manure to any extent that may be considered necessary. These surface roots ought, therefore, to be taken great care of, and encouraged by all possible means, as being amongst the most valuable of any belonging to the vine, and as contributing in a high degree to improve the flavor of the fruit, and to insure its ripening, even in the most unfavorable seasons.

The border, therefore, after it is once made, ought never to be stirred but at intervals, when necessary to prevent the surface of it from becoming a hard impervious coat. On such occasions it should be carefully forked to the depth of a couple of inches, which will keep it sufficiently loose and open to receive the full influence of the sun and air. Whenever weeds appear, they should be hoed up or plucked by the hand immediately. In fine, the border should be kept sacred from the intrusion of any other plant, tree, or vegetable production whatsoever, and be solely devoted to the growth and nourishment of the roots of the vines.

Here, before concluding these remarks upon soil, &c., it is necessary to observe, that although the foregoing directions with respect to the soil, preparation

of the borders, &c., will, if followed, *ensure* the prosperous growth of vines, and the annual production and maturation of fine crops of grapes, and are therefore highly deserving of being practically adopted at all times when circumstances permit; yet, it must not therefore be supposed that vines will not grow and mature fine fruit unless planted in well prepared borders. Quite the contrary is the fact; for vines will do well in any unprepared soil that is not too stiff and that has a dry bottom; but they grow quicker, and consequently bear greater crops of grapes within a given space of time, when planted in a soil that has been properly prepared for their reception.

For instance, if two cuttings be planted, the one in a soil of the former description, and the other in one of the latter, it will be found at the end of ten years, that the stem of the vine growing in the soil that was unprepared will not be more than half the size of that planted in the other; consequently, for every pound weight of fruit which the smaller stemmed vine can mature, the other will ripen very nearly three pounds. This difference occurring annually, is sufficiently great to repay most amply the trouble and expense incurred in making a suitable border, whenever local circumstances will permit of such an operation being performed. Nevertheless, the disadvantages of a poor soil or an unprepared one may in some measure be compensated, by planting the vines closer together, in which case, the surface of the wall will be much sooner covered with fruit than otherwise. If vines, indeed, could not be planted with any prospect of success in any other situations than in borders set apart for that purpose, but a very small quantity of grapes would be grown, compared with what the country is capable of producing. Innumerable instances occur throughout the country, and especially in towns and

their suburban districts, in which walls, cottages, houses, and various descriptions of brick and stone erections, present very favorable aspects for the training of vines, but which, nevertheless, are so situated locally, as to possess little or no soil at all on the surface adjoining their sites, the ground abutting them being either paved with bricks or stone, or perhaps trodden so hard as to be apparently incapable of yielding sustenance to any vegetable production.

In all such cases, however, if the ground adjoining the site of the wall or building be opened to the extent of eighteen inches square, and as many deep, it will be sufficient to admit the roots of a young vine which must be pruned to suit that space. If a wider and deeper space be made, it will of course be better, but if not, that *will* do. After the sides and bottom have been loosened as much as possible, the vine may be planted, and the hole filled up with two-thirds of rich loamy earth, and one-third of road scrapings previously mixed well together; and if necessary, the surface covering, whether of stone, brick, or otherwise, may be restored again to its former state, provided a space of about six inches square, be left open for the stem to swell in during its future growth. Vines planted in such situations will in general do well, although their growth will not be so rapid as when planted under more favorable circumstances.

In all cases where vines are planted against any description of buildings, their roots push as soon as possible under the foundations, being attracted thither by the warm air which is there generated; and such situations being also dry, from the excavations which have been made, offer to the roots the same protection from excessive moisture, as the substratum of a well prepared border. The same may be observed of vines planted against walls, the foundations of

which possess similar advantages, although in a more limited degree. Hence the fact may be inferred, that vines planted in such situations, without any previous preparation of the soil, will frequently grow as luxuriantly and produce as fine grapes, as those planted in rich and well prepared borders.

Indeed, it is hardly possible to plant a vine in any situation in which it will not thrive, provided its roots can by any means push themselves into a dry place, and the aspect be such as to afford to its branches a sufficient portion of the sun's rays to elaborate the juices of the plant. The truth is, that the roots of the vine possess an extraordinary power of adapting themselves to any situation in which they may be planted, provided it be a *dry* one. They will ramble in every direction in search after food, and extract nourishment from sources apparently the most barren. In short, they are the best caterers that can possibly be imagined, for they will grow and even thrive luxuriantly where almost every other description of plant or tree would inevitably starve.

CHAPTER VI.

ON MANURE.

Every substance that enriches the soil and stimulates the growth of plants, may be called a manure.

As a border in which vines are to be planted ought never to be disturbed after having been once properly made, it follows that those manures that can be applied with advantage to promote their growth, com-

prehend, *first*, such as can be mixed and incorporated with the soil at the formation of the border, and which add to its fertility from time to time according to the respective periods of their decomposition and amalgamation with it; and, *secondly*, such as can be applied in a liquid state, or otherwise, as a top dressing, at any subsequent period.

Of those manures, therefore, that may be mixed with the soil when the border is first made, the best are such as possess the two valuable qualities of affording to the roots of the vine *the highest degree of nourishment* combined with *the greatest permanency of duration*. Of this description are *bones*, *horns and hoofs of cattle*, *bone dust*, *the entire carcasses of animals*, *cuttings of leather*, *woolen rags*, *feathers* and *hair*.

It is unnecessary to enter into a minute detail of the various properties of these manures; chemical analysis having ascertained, and experience amply proved, that all of them, as they gradually and respectively decompose, offer to the roots of plants an abundant supply of food of the most nourishing description.

Bones, however, on account of their prolonged effect, are by far the most valuable manure that can be deposited in a vine border. They should be buried in the soil whole and as fresh as possible. Every variety of size may be procured, from the smallest bone of a fowl, to the largest bone of an ox. The small bones will decompose in a few months but the largest will remain for twenty, thirty, and even fifty years, before they are entirely decayed, while the intermediate-sized ones, according to their respective kinds, will be continually decomposing in succession for a great number of years, yielding thereby a constant supply of nutriment of the most valuable de-

scription. It is worthy of remark, also, that every bone, whether small or large, after it has been deposited in the soil a few weeks, will begin to yield, by the decomposition of the gluten on its surface, a steady supply of nutritious matter, and continue so to do until it be resolved into its constituent parts and form part of the soil itself.

Many results might be adduced, of experiments at various times, to ascertain the value of entire bones as manure to the roots of vines, all of which would prove that they yield, beyond all comparison, a more *permanent* supply of nourishment, than can be obtained from any other substance used as manure. The details of these would occupy too great a space; those of two, however, may perhaps be advantageously mentioned.

In the year 1826, several vines were planted against a wall having a south aspect, in a border the soil of which is a stiff clayey loam. In the following year, a quantity of bones, not more than a bushel, the largest of which was the blade bone of a calf, was digged into the border at a distance of five feet from the wall. They were deposited all together as a horizontal layer of six inches in depth, the upper surface being twelve inches and the bottom eighteen, from the surface of the border. In the spring of 1833 the border was opened, in order to ascertain to what extent the roots of the vines were nourished by these bones. On examination, it was found that the roots had branched out in every possible direction amongst the bones, the surfaces of which were completely covered with their fibres. The blade bone happened to be in such a position that both sides of it could be distinctly seen, and on examining them minutely, they appeared to have every part of their surface covered with the smallest fibres imaginable; so small,

indeed, were some of them, that they could scarcely be discerned by the naked eye. Their extremities were fixed on the surface of the bone as firmly and in the same manner as a leech when applied for the purpose of sucking blood; and they were evidently extracting, by means of their mouths or pores, an abundant supply of nourishing food. From the different shades of color apparent in many of the larger parent fibres, and other indications of annual growth, it appeared that they had been enjoying the banquet which this bone afforded for at least five years; and as it was but little decayed, it seemed to promise them a continuation of the feast for ten or fifteen years to come. The whole appearance of the bone was singular in the extreme, being completely enveloped in a mass of apparently beautiful gauze network.

The chief part of the roots which had multiplied so prodigiously amongst these bones, was found to proceed from a single root which had pushed itself horizontally and in a direct line through the border till it reached the bones, throwing out in its course but few fibres, the soil being of an unfavorable nature to afford them much food. The root proceeded from a black Hamburgh vine, which has for several years past produced some of the finest bearing shoots I ever saw, from which I annually obtain bunches of grapes weighing from one to two pounds, with berries measuring from two inches and a half to three inches in circumference.

A similar examination of another border some years since produced the like result. About seven years previously to my inspecting it, a few bones had been inserted in the soil, one of which was the thigh bone of an ox. After carefully removing the top spit of the border, into which the fibres of the roots had

pushed themselves pretty thickly, I discovered this bone about a foot below the surface, and four feet distant from the stem of a vine. The hollow part of it which had contained the marrow, was open at both ends. On examining it, I found that a root of the vine had traversed the surface of it in a direct line from one end to the other, throwing out an immense number of small fibres which covered its entire convex surface. On a closer inspection, and tracing the course of the root, it appeared, that when it had reached the end of the bone, instead of pushing straight forward into the soil, it had turned down over the single thickness, entered the hollow part, and was returning through the inside of the bone towards the same end at which it first came in contact with it. The bone was very thick, and though it had been in the ground seven years, it presented scarcely any signs of decay. It was so completely enveloped in fibres, that no further examination could take place without putting the health of the vine in jeopardy. This vine is also a black Hamburgh, and for many years past it has annually produced both fruit and current year's bearing shoots of the very finest description, although the soil in which it grows is far from being a rich one. The fact of the root clinging to the bone and making a *retrograde* movement through the hollow part of it, rather than push forward into the soil, is conclusive as to its decided preference of the former to the latter, and the surprising number of fibres, which, in both of these instances were absorbing nutriment through the medium of their spongioles, or newly-formed extremities, clearly shews that whole bones deposited in the soil in their fresh and entire state, furnish to the roots of vines for a long period of time, an extraordinary supply of food of the richest description.

I have stated these circumstances in detail, because such facts are worth all the theories in the world.

Horns and hoofs of cattle or the *parings* or *shavings* of them, may be classed next to bones in point of value, while their effects last, but their duration is not so long, nor are they indeed to be procured in sufficient abundance to be calculated upon for an adequate supply.

Bone dust is a very powerful manure, producing immediate effect, and is lasting in its duration; but the process of boiling bones previously to their being crushed, deprives them of their very best qualities.

The entire carcasses of animals or any portions of them, dead birds, &c. &c independently of their bones, yield, after decomposition, an extraordinary supply of food for the roots of vines, impregnating the soil all around with a great variety of nutritious matter. Dead animals of every description, such as dogs, cats, pigs, &c., that have died, may be thus disposed of in a most advantageous manner, by depositing them in their entire state in the vine border.

Cuttings of leather, old or new, old shoes, &c. are a very valuable manure, remaining in the ground many years before entirely decomposed. The roots of vines are very partial to this description of manure. I have examined the soles of old shoes that have been deposited in the soil upwards of seven years, and have found their surfaces covered with fibres, feeding eagerly upon them.

Woolen rags, feathers, and hair, may all be mentioned as valuable manures, yielding during their decomposition, a great supply of nutritious matter.

A vast number of other substances well known as manures might be enumerated, but though many of these would be found to be very valuable with reference to their immediate effect, their good qualities

being of transient duration would be entirely dissipated before the roots of the vines could derive any lasting benefit from them. Moreover, powerful manures of short duration excite vines to a sort of premature growth, and when the roots are becoming strong and vigorous, and capable of absorbing with advantage a greater quantity of nutriment, the manure is exhausted, and the plants immediately make a retrograde movement, in consequence of having been unnaturally excited by a gluttonous supply of stimulating food. *Steadiness of supply* and *permanency of duration*, are the two grand requisites of all manures intended to be deposited in borders appropriated for the growth of vines; and those already enumerated have been found by experience to possess these valuable qualities in a greater degree than any other.

As a point of culture of great importance to be attended to in depositing manure in the soil, care must be taken not to dig it in too deeply. The roots of vines should be induced to extend themselves in a horizontal manner and as near the surface of the border as possible. Solar heat is generally supposed to penetrate to the depth of three feet, but its effects at that distance from the surface cannot be very strong, especially in soils that are of an adhesive nature. The food, therefore, that is provided for the roots of vines should lie imbedded in the soil in the form of a horizontal stratum or layer, the top of which should be about six inches, and the bottom not more than two feet below the surface. Manure so deposited, will cause the roots to spread themselves out within such a distance of the surface as will keep them warm and dry, and enable them to receive the cherishing influence of the sun and air.

Liquid manure. This is a species of manure that is highly valuable where immediate effect is required.

As the pores which abound in the fibres of the roots of plants are too small to admit of any solid substance passing into them, and can only absorb nutriment when presented to them either in a fluid or gaseous state, liquid manures act with a far greater degree of energy than those of a solid nature, inasmuch as they contain all the soluble parts of manure in such a state as to admit of being taken up by the roots as soon as applied. The most powerful are *urine*, *soot-water*, *blood*, *the drainings of dung-heaps and soap-suds*.

Urine, on account of its saline qualities, is better calculated to promote the fertility of the vine, than any other liquid whatever. It should be used as fresh as possible, and if applied in the growing season, or betwixt the middle of March and the first of November, it should be mixed with an equal quantity of water; at any other period of the year, it may be cast on the border in its natural state.

Soot, dissolved in water, in the proportion of one quart of the former to twelve quarts of the latter, and mixed a few days previously to its being used, is an exceedingly strong manure, highly stimulating in its nature and a great purifier of the soil.

Blood, *the drainings of dung-heaps*, *and soap-suds*, should be used as fresh as possible, in order that their good qualities may be preserved entire. They are all valuable manures, and calculated to enrich the soil in a very high degreee.

To the foregoing may be added *every description of liquid refuse* that proceeds from a dwelling-house or human habitation. All such constitute a valuable class of manures and may therefore be applied to a vine border with the greatest advantage. If any be too strong and spirituous, an equal quantity of water should be mixed with them, previously to their being used.

For the purpose of *top dressing*, and to be forked into the border when requisite, may be named as highly enriching manures, *night soil, fish, stable manure, and the excrements of every description of birds and animals.* Night soil is a very stimulating manure, but transient in its effects, which renders it more fit for a top dressing than to be used as a component part of the border when first made. If spread on the surface in a thin layer, it will soon dry, and may then be forked in, in a pulverized state.

In concluding these remarks on manure, it is necessary further to observe, with respect to the application of liquid manures and top dressings, that care must be taken not to make the surface of the border too rich. An excess of manure deteriorates the flavor of the grapes, and is moreover, injurious to the fertility of a vine, inasmuch as it stimulates the plant too highly, causing thereby an excessive and unnatural growth of wood, which, being formed too rapidly, becomes long jointed and productive of leaf-buds instead of fruit-buds. Liquid manures and top dressings, therefore, must be judiciously applied, lest a rank and barren vegetation be induced in lieu of a healthy and fruitful one. This cautionary remark is the more necessary, as vines are well known to be amongst the grossest feeders in nature; their roots absorbing with the appetite of a glutton, every description of liquid refuse that is placed within their reach, however fetid or nauseous it may be.

CHAPTER VII.

ON THE CONSTRUCTION OF WALLS.

To ripen any of the sorts of grapes cultivated in this country sufficiently to be used as table fruit, requires the shelter and reflected heat of a wall.

The proper *height* of a wall intended for the training of vines upon, must depend in a great measure on local circumstances. In an unsheltered situation, and an aspect exposed to the injurious influence of westerly or south-westerly winds, I have never seen prime grapes produced much higher than eight feet from the ground. But in situations and aspects of an opposite description, no limit to the height of a wall need be assigned, for as fine grapes may be matured at the distance of twenty feet from the ground, as at any less height. Grapes, when growing at a less distance than about four feet from the ground, certainly enjoy a considerable increase of reflected heat, particularly if the surface adjoining the wall be paved; but, on the other hand, to counterbalance this advantage, if the aspect be *east* or *west*, the sun will shine longer on the upper part of the wall than on the lower part, in consequence of which, the surface of the wall will be found, in general, pretty equally heated in all its parts. But if the aspect be *south*, the solar rays during the summer will strike the entire surface of the wall at the same instant of time, unless there be some local impediment; and in this aspect, therefore, the lower part of the wall will enjoy an increased degree of warmth from the reflection of the ground. Hence, grapes growing within two or three feet of the bot-

tom of a wall facing the south, will in general ripen from ten days to a fortnight earlier than those growing on the upper part of it. There is a disadvantage, however, in training grapes near the ground as it respects their remaining on the vine after being ripe. If grapes can be kept perfectly *dry*, they will hang on the vine and improve in flavor for a long time after they are ripe; but if dampness or moisture of any description reach them, the consequences are quickly seen in the decay of the berries. After the middle of October, therefore, it will be found a difficult matter to preserve grapes that hang within two feet of the ground, on account of the damp exhalations that continually arise from the soil at that period of the year.

If walls be built for the express purpose of producing grapes, the most judicious expenditure of the materials will be in the erection of several low walls, not more than six feet high, in preference to a small number of very high walls. For the purpose of pruning and training, and the general management of the vines, walls of this height are far more convenient than those of a greater height; and if built to run directly north and south, the entire surface of both sides of each wall will be available for the training of the vines; and as such walls need not be built at a great distance apart, an astonishing quantity of grapes may be thus annually grown on a small extent of ground by the erection of a few walls of this description, built parallel to, and not far distant from each other.

The best *materials* for the construction of vine walls, are without doubt *bricks*, as they present a more even surface than can be obtained from walls built of any other description of materials; and evenness of surface is a quality that cannot be dispensed with. It is not only necessary for the training of vines with precision, but if the surface of the wall be

not smooth and even, the grapes will be at times considerably injured by being blown to and fro by the wind against the rough and uneven parts of it.

Dark colored flint walls are hotter than brick, but this advantage is more than counterbalanced by their uneven surface. But if the faces of the flints be well hammer-dressed, and the joints of the wall made to run in proper courses, they make a handsome wall, and one that will absorb and retain heat in a greater degree than any other.

If, from local causes, neither bricks nor flints can be procured, stone of any description may be substituted, but the darker the color and the closer the texture, the more will it absorb and retain heat and repel moisture; and consequently the better will it be adapted for the end in view.

As a substitute for walls, *stout ranges of paling* made of well seasoned wood, or of the planks of old ships, well coated over with paint, are at times erected; but grapes produced in this way, are seldom equal to those grown on walls.

For the *foundation* of a vine wall, stone is preferable to bricks, the former being more solid and durable. And if the wall be an outer one, and the soil on the outside of it be of such a description as to render it necessary that the roots of the vines should be prevented from getting into it, the foundation ought to be deep, and cemented firmly together, so as to make it as solid as possible. But if the soil on each side of the wall be such as to make it advantageous for the roots to run freely into it, no greater depth need be gone to, nor should any more cement be used in putting the materials together than is necessary to make the foundation sufficiently strong and firm to support the superstructure. The drier and looser, indeed, that the materials can be laid together, and the great-

er number of cavities and interstices that can be left in the foundation, the better adapted will it be to admit the roots of the vines, which delight to ramble amongst such materials in preference to growing in even the richest soil.

Blackening the surface of a wall is productive of a considerable increase of heat as long as the sun shines upon it; but during the night, and such part of the day as the surface is in the shade, it will make the wall colder. This arises from the black-colored surface parting with its heat immediately the sun's rays are withdrawn. With respect, therefore, to walls facing the *east* or *west*, the surfaces of which, even in the height of summer, do not receive the solar rays more than one third of every twenty-four hours, the coloring of them black will be injurious rather than otherwise, inasmuch as the intensity of the cold increases in proportion to the sun's absence. But when the aspect is due *south*, or very nearly so, the surface of a wall may be blackened with advantage, as the duration of the sun's absence, as compared with his presence, is more equally balanced throughout the summer months, and the increase of heat, therefore, is more than equivalent to that of the cold; the former, being, on a clear day, and when the sun is on the meridian, frequently from ten to twenty degrees more than that of the surface of an unblackened wall.

Lime-washing the surface of a vine wall every year will be found very advantageous in keeping it clean, and free from insects and the growth of moss. Newly built walls may be exempted from this operation during the first three or four years after their erection: but in every subsequent year, it is almost indispensable. When the surface of a wall is covered with the foliage of a vine, the nails used in training the shoots are necessarily numerous: and these being withdrawn

at the autumnal pruning, their holes are quickly taken possession of by various descriptions of insects. If these be suffered to remain unmolested, they will multiply amazingly during the next summer: and in the autumn, when the fruit is cut, the bunches will be infested with them to an injurious and offensive degree. The nail-holes may certainly be filled with mortar; but this is a tedious operation, and produces an unsightly appearance. I have never found any thing so effectual as a good coating of whitewash, made from new lime, and of a thickish consistency. This, by filling up the holes and other vacancies, effectually destroys all the vermin, prevents the growth of moss, and promotes not a little the healthy vegetation of the vines. The face of the wall will thus be renovated, and made to look as well as when first built; and its pure whiteness will add greatly to the cheerful appearance of the garden. The proper time of the year to perform this operation, is at the beginning of March, just as the winter covering of the bud is about to open: but if the season be forward, the last week in February will do better. The vines should be unnailed, and held at a little distance from the wall by one person, while another washes its surface; after which the branches may be trained and nailed for the season, or otherwise temporarily so, until that operation can be conveniently performed. If the wash fall on any of the branches, it will not be of the slightest consequence; as, though a little unsightly at first, it will quickly disappear at the rising of the sap.

Projecting copings fixed on vine walls, though attended with many advantages are not without some disadvantages. They are very beneficial in protecting the young shoots of the vines from the effects of late frosts in the spring, in preserving the blossoms

from cold dews and heavy rains, and in keeping the grapes in good condition for a considerable period of time after they have become ripe. They also contribute to prevent the escape of heat from the wall, and are likewise extremely convenient to fasten netting, bunting, &c., to, when necessary to protect the fruit from birds and insects. On the other hand, they exclude a portion of light and air, and prevent the dew, and in some measure the rain, also, from descending on the foliage, and these are very beneficial after the fruit is set and until it begins to ripen. Nevertheless, the advantages of projecting copings decidedly preponderate. If there were no other benefit arising from them, that of protecting the fruit from heavy rains, and thereby keeping it dry and in good condition for two or three months after it is ripe, would be quite sufficient to turn the scale at once in their favor. With respect to the width of the projecting part when permanently fixed, that must depend on the aspect and height of the wall. If the latter be *less* than four feet, and the aspect *south*, the coping ought not to project at all, as the light and solar heat excluded by it will be a serious drawback on the healthy vegetation of the vines. But if the wall be four feet high, then the coping may project as many inches; and if this width be increased an inch every foot that the wall increases in height up to twelve feet, the principal advantages arising from the protection which a coping affords will be secured in conjunction with the smallest portion of its disadvantages. If the wall, therefore, be twelve feet high, the coping will project a foot — more than which no coping should project, whatever may be the height of the wall. If the aspect be *east* or *west*, the coping must be as narrow as possible, as every inch of projection in these aspects causes a

considerable diminution in the duration of sunshine on the surface of the wall. If the height of the wall be *less* than six feet, a projection had better be dispensed with: but if it reach that height, one of four inches in width may be used; and this may be increased half an inch every foot the wall is higher, until it reach the width of twelve inches, which will give a height of twenty-two feet for the wall. It is seldom that a mere wall reaches this height: but whatever height a wall may be, if the width of the coping correspond to these proportions, the advantages derived therefrom will be as great as can be obtained in these aspects, without, in an injurious degree, excluding the solar rays. It may be remarked, also, that a projection of *less* than *four* inches in width on a vine wall, is calculated to do more harm than good, as the drip will fall on the fruit, which, in any stage of its growth, will greatly injure it.

Moveable wooden copings may be used with great advantage, as they produce all the benefit of fixed copings without any of their disadvantages. Copings of this description may project a little more than the proportions above-mentioned, those being intended to apply to *fixed* copings only. If temporary copings be used, the proper periods of the year for their application will be as follows: — First, from the twenty-first of March to the middle of May; to protect the young shoots from the injurious effects of late frosts and from descending cold. Secondly, from the first expanding of the blossoms until the berries are well set. And, thirdly, from the period of the berries becoming transparent and showing symptoms of ripening until the fruit be all cut from the vines. During this last-mentioned period, the coping will prove of the greatest advantage in keeping the fruit *dry*, for it may be remarked, that as soon as grapes

begin to make their last swell, which is indicated by their becoming transparent, not a drop of rain should ever be suffered to fall upon them, if it can possibly be avoided. All the moisture which they stand in need of they will freely imbibe from the atmosphere.

In concluding these observations on the construction of walls, it must be further observed that, in addition to the surface of a vine wall being as smooth as possible, it ought also to be a true perpendicular, and the wall itself to run in a straight line. These qualities are necessary to ensure an equal distribution of solar heat on its surface, and also an exemption from the increased action of violent winds, which is sure to be generated in some way or other, if the wall be built otherwise than in a straight line.

CHAPTER VIII.

ON THE PROPAGATION OF VINES.

VINES are propagated in the open ground by layers and by cuttings.

By layers. This is the most expeditious method of raising vines, provided the shoots be laid down in *pots* and *planted out the same summer.* But vines raised from shoots laid down in the open ground seldom ripen their roots well, and are therefore inferior to those raised from cuttings. There is also another objection to this mode of propagating vines. No shoots of a well-established vine can be laid down in a border without the roots growing amongst those of the parent vine. When the proper season arrives for

the removal of the young plant, the ground requires to be digged to the depth of nineteen inches, in order to take up its roots as entire as possible. Now, a vine border cannot be digged to this depth, nor, indeed, anything like it, without very greatly injuring the roots of the parent vine. For this reason, therefore, and on account of the roots of young plants so raised frequently dying off to a considerable extent in the ensuing winter through not being sufficiently ripened, the raising of vines by layers in the open ground may be regarded as an inferior method of propagation.

To raise vines by laying down the shoots in pots to be planted out in the current summer, the following directions, if followed, will insure success. For each layer procure a pot of the size of No. 24, and prepare some rich mould, which must be sifted very fine. Put a large piece of potsherd, or a good-sized oyster-shell over the hole at the bottom; fill the pot about two-thirds full with the mould, and sink it three inches below the surface of the soil. Then take the shoot, the four last buds of which will be required to form the layer, and cut the *fourth* bud cleanly and smoothly out, so that no shoot can afterwards push from it. Bend the shoot carefully down in such a manner that the *second* and *third* buds shall be at least three inches below the surface of the mould when filled in, and the *first* bud even with it, or rather just peeping out of the mould. Secure the shoot firmly in this position, so that its own force will not raise it up, then fill the pot up with mould to within half an inch of the top, which space must be left for holding liquid manure. If the mould settle down afterwards, and leave a greater space than this, more must be added to make good the deficiency. Shoots may be thus laid down any time from

the fall of the leaf to the middle of March. The latter period will be quite early enough, as no roots will be made before the latter end of June or the beginning of July. After the first of April the mould in the pot must be *constantly kept moist*, for which purpose supply it as often as necessary with soap-suds or the drainings of a dung-heap. The layer must be separated from the parent vine some time between the twentieth of August and the first of September, and planted out immediately, with the ball of earth entire, in the situation in which it is intended to remain. Supply it plentifully with liquid manure of the above-mentioned description throughout the remainder of the season till the fall of the leaf. It is not necessary to wring, twist, cut or pierce the layer, before bending it down in the pot: keeping the mould constantly moist with liquid manure, will excite it to root very freely without any such operation. If the foregoing directions be followed, the roots will be four feet long before the winter sets in.

It is necessary, however, to state distinctly, that the success of the operation depends entirely on *keeping the mould in the pot continually moist, on separating the layer from the parent vine at the time above-mentioned, on immediately planting it in the spot where it is to remain, and in keeping it well supplied with liquid manure throughout the remaining part of the season.* If the layer were suffered to maintain its union with the parent vine throughout the autumn, the roots would nearly all die away, in consequence of their not having attained to a sufficient degree of maturity to support their own vitality. If the terminal bud when it bursts should show fruit, it must be pinched off immediately; and as the shoot advances in growth, it must as often as necessary, be tied to a stake, or what will be much bet-

ter, trained against the wall. The tendrils should be cut off as soon as they are about four inches long, and the lateral or side shoots kept pinched back to one eye. At the end of the season, as soon as the leaves are shed, the plant must be cut down to the two lowermost buds. It may be remarked, that by laying shoots in this manner, fine grapes may be grown in pots, for the purpose of being cut from the parent vine when the fruit is ripe, and produced at table as living plants in full bearing.

By cuttings. This is the best method of propagating vines in the open ground, when the plants are either to be raised in the situation where they are finally to remain, or to be transplanted in the ensuing winter, or at any subsequent period. To provide cuttings to be planted at the proper season, select at the autumnal pruning a sufficient number of shoots of the preceding summer's growth. Choose such as are well ripened, of a medium size, and moderately short jointed. Cut them into convenient lengths of six or eight buds each, leaving at the ends not less than a couple of inches of the blank wood for the protection of the terminal buds. Stick these temporary cuttings about nine inches in the ground, in a warm and sheltered situation, where they will be effectually protected from the severity of the winter. The best time to plant them out is about the middle of March, but any time from the first of that month to the tenth of April will do very well. When this period arrives, if the young vines about to be raised are afterwards to be transplanted, choose such a situation for the planting of the cuttings, as is well sheltered from the wind, and not too much exposed to the sun. More than six hours sunshine in any day will be injurious rather than beneficial, and with respect to the wind, if the cuttings be not protected

from its injurious effects, they will scarcely strike at all, even in the very best prepared soil. A moderate portion of sunshine and effectual shelter from the wind, are absolutely necessary to ensure the growth of the cuttings. Previously to planting them, the soil must be well prepared for their reception, by being digged to the depth of eighteen inches, and the earth made *very fine*. If it be in any degree stiff or heavy, take two-thirds of it entirely away, and supply its place with light rich mould or road-scrapings. For every cutting add half a spit of well rotted dung from an old cucumber bed, and mix the whole well together, making it as fine as possible. This being done, prepare the cuttings in the following manner. Cut the shoots into lengths containing two buds each, and let the uppermost buds have an inch of blank wood remaining beyond them. The extremities of these must be cut in a slanting manner, and the slant sides be opposite to the buds. Take the other ends of the cuttings that are to be inserted in the ground and cut them transversly *just below the buds*, and the cuttings will be complete. The pruning knife should be very sharp, so that the cuts at the ends may be perfectly smooth. The length of each cutting betwixt the two buds should not be less than *four* nor more than *six* inches, in order that the bottom buds may be at such a distance from the surface of the soil, as will best promote their vegetation.

The cuttings being thus prepared, must be planted immediately, for which purpose make holes in the ground (about a foot apart each way, if the plants when raised are to be subsequently transplanted) with a stick about the size of the cuttings, and insert the latter so that the uppermost buds shall be just even with the surface of the ground. Press the

mould close around each cutting, in order to prevent the sun and air drying up its juices. If the mould should subsequently sink down, and leave the buds above the surface, more must be added to keep them even with it. After the first of May, care must be taken to keep the soil round the cuttings constantly moist. For this purpose supply each cutting as often as required, according to the state of the weather, with about a pint of soap-suds; and continue so to do until it has formed a communication with the soil, which will soon be rendered apparent by the protrusion of a shoot, and its daily elongation. When the bud bursts, the process of evaporation commences, and if the moisture in the cutting be consumed quicker than the latter can absorb it from the soil, the young leaves turn yellow and die, and the vitality of the cutting is destroyed. It is indispensable, therefore, that the soil round each cutting should be kept constantly *moist*, in order that the latter may absorb sufficient nourishment to supply the bud with food, until, by the emission of roots, it has established a communication with the soil, and is thereby enabled to feed itself. As soon as the cuttings have protruded shoots about three inches long, and their leaves have a healthy appearance, watering may cease for a time, but throughout the summer, when the weather is dry, the young plants should be assisted in their growth by the moderate application of liquid manure. Soap-suds are the best for this purpose, but dung-water will do very well, provided it be not too powerful. The surface of the soil round the cuttings should never be allowed to cake or get hard, but should be kept open and in a fresh and finely pulverized state, by being, as often as necessary, forked lightly up. As the shoots advance in growth, they must be constantly kept staked, or nailed to the

wall; and their tendrils and lateral shoots managed throughout the summer in the same manner as directed with the layers. At the fall of the leaf cut every plant down to the two lowermost buds.

CHAPTER IX.

ON THE PRUNING OF VINES.

PRUNING and training are so closely connected together, and so mutually dependant on each other, that they almost constitute one operation. In pruning a vine regard must be had to the manner in which it is afterwards to be trained; and in training it, the position of the branches must in a great measure be regulated by the mode in which it has previously been pruned. Nevertheless, the two operations are sufficiently distinct to be treated of separately, although many observations that will be made will relate as much to the one as to the other.

The chief object in pruning a vine is to increase its fertility; which is effected by cutting out the superabundant wood which it annually produces, and adjusting the number and length of the branches that are to remain to the capacity of the plant for the maturation of its next crop of fruit, and for the production of future bearing wood. The necessity for this operation will appear evident when it is considered, *first*, that the shoots of a vine which bear fruit one year, never bear any afterwards;—*secondly*, that those parts of the shoots that grow in the latter

part of the summer are not sufficiently ripened to produce fruit;—*third'y*, that a great number of shoots, including those that push from the basis of the buds, and which are thence called lateral or side shoots, are too small and otherwise unfit to produce fruit;—and *fourthly*, that a vine in vigorous growth and under judicious management will annually produce a much greater number of buds that would bear fruit in the following year, if retained, than it can possibly bring to perfection. To get rid, therefore, of all this useless and superabundant wood, the operation of pruning must be resorted to; and as the excess is very great, the pruning knife must be exercised in a correspondingly severe manner in order to restore the balance betwixt the roots and the branches. From these considerations it follows, that the judicious pruning of a vine, is one of the most important points of culture throughout the whole routine of its management. There are three methods of pruning the vine, in practice among gardeners; namely: *long pruning*, *spur pruning*, and the *fan* or *fruit tree method*. The first mentioned is that which will hereafter be shewn to be the most eligible method of pruning the vine, which, with respect to this point of culture, requires to be treated very differently to every other description of fruit tree cultivated in this country. Many elaborate directions on this subject have been given by writers on gardening; but these being in general based upon no definite principle, cannot with any degree of certainty be reduced to practice. The truth is, that although the fertility of a vine depends in a great measure on the manner in which it is pruned from time to time; and that, for various reasons, the operation may be supposed by those who are unacquainted with the nature of the plant to be intricate, and to require a considerable

portion of skill, yet, the contrary is the fact; for, if the *principle* on which it is to be performed be carefully kept in view, the whole art of pruning a vine lies in a nut shell.

In order to render this art as clear as possible, the reasons on which it is founded require to be distinctly shewn. For this purpose, it is necessary to make an important preliminary remark—namely: that the *old wood* of a vine, or that which has previously borne fruit, is not only of no further use at any subsequent period, but is a positive injury to the fertility of the plant. The truth of this remark depends on the fact, that every branch of a vine that produces no foliage, appropriates for its own support a portion of the juices of the plant that is generated by those branches that *do* produce foliage. To prove this fact, and to make it as clear as possible, it will be necessary to describe briefly, and in part, the process by which the life of a vine is sustained and its parts annually nourished.

The first movement of the sap in the spring takes place in the branches, and lastly in the roots. The buds, in consequence of the increasing temperature of the air, first swell and attract the sap in their vicinity. This fluid, having lain dormant, or nearly so, throughout the preceding winter, becomes gradually expanded by the influence of the solar rays, and supplies the buds with nourishment from the parts immediately below them. The vessels which yield this supply, becoming in consequence exhausted, are quickly filled by fluid from the parts below *them*, and in this manner the motion continues until it reaches the roots, the grand reservoir of the sap; by which time, the solar heat having penetrated the soil, the roots begin to feel its enlivening influence. The whole body of sap then begins to move upwards;

and as soon as the quantity propelled is more than sufficient to distend all the vessels in the stem and the branches, the buds begin to elongate and unfold. This takes place in general about the vernal equinox. From this time, the fluid becoming more expanded every hour, its ascent is simultaneously increased in force and velocity. The vessels in the branches being filled to repletion, the buds quickly open, and shoots and leaves rapidly protrude. The beginning of May arrives; and by that time, the sap being in full motion, all is life, vigor, and activity, from one extremity of the vine to the other.

The leaves attract the sap as soon as it reaches their vicinity; and by one of the most wonderful processes that can be conceived, the result of exquisite organization, elaborate and prepare it, and render it fit for the nourishment of all the parts of the plant. The sap, after being thus prepared, is called the *proper juice* of the plant. It then returns downwards betwixt the bark and the alburnum; and, in its descent, is distributed laterally to every part of the plant, until it finally reaches the extremities of the roots. During its descent, a considerable portion of it is expended in the formation of a concentric layer of woody substance betwixt the bark and the wood, on every branch and also on the stem; which layer becomes the new alburnum.

Now, it is of importance to remember that *every* branch annually requires this new concentric layer; that this layer is formed from the proper juice prepared in the leaves; and that the thickness or thinness of this layer depends on the proportion which the quantity of proper juice so prepared bears to the number, length, and size of the branches which it has, in its descent, to cover and feed.

If, therefore, the foliage of a vine be strong and

vigorous in its growth, and there be no *naked branches* betwixt the shoots which produce the foliage and the stem; then the proper juice, in its descent, will deposit on the stem a *thick* layer, and will also descend into the roots in great quantity. But if there be *a great number of naked branches* which the proper juice in its descent has to clothe and nourish; then, having to spread itself over a much greater surface, the new layer will be comparatively a *thin* one, and the surplus left to enter the roots *proportionately lessened* in quantity. And further, *if the foliage be weak*, which is invariably indicated by the shoots and leaves being small in size, and sickly in appearance, and the vine contain many *naked branches*, then the quantity of proper juice prepared in the leaves, will be so small in proportion to the demands which in its descent will be made upon it, that a new layer will with difficulty be formed at all, while but *a very small portion* of the proper juice will be left to descend into the roots.

Again: the formation of this concentric layer being continued from the stem downwards on all the roots, the latter become increased in their solid diameter, in direct proportion to the quantity of the proper juice which they thus receive. Whatever, therefore, contributes to *diminish* this quantity of proper juice, prevents, in a proportionate degree, the growth of the roots; while on the other hand, whatever causes an *increase* of it, produces effects precisely opposite. Further; there is no reason to believe that the naked branches of a vine, especially such as are more than two or three years old, are in any way instrumental in increasing the volume of sap in its ascent; the processes of transpiration and absorption which they carry on, being limited in their effects to the preservation of their own vitality.

From the foregoing observations, therefore, it appears that every naked branch of a vine, or one that does not *directly* produce foliage, diminishes the capacity of the plant for the production of young bearing shoots, inasmuch as it contributes nothing to the growth of the vine; but, on the contrary, requires to be fed annually with a certain portion of the elaborated juice of the plant, which would otherwise be expended in the enlargement of the diameter of its stem; and thereby the increase of its capacity to mature fruit, and in the extension and multiplication of its roots. Naked branches, therefore, are consumers but not producers; or in other words, drones in the hive. If the vine were cultivated for the sake of its *wood*, the case would be different. The growth and extension of large branches and the increase of their diameters, would then be the legitimate object in view; but when fruit only is sought, and the operation of pruning resorted to in order to obtain the largest quantity within the smallest possible extent of a given surface of walling, it is obvious that no description of wood should be suffered to remain in a vine, but such as directly contributes in some way or other to the production of fruit.

It follows, therefore, that as the sole object in view in pruning a vine, is to increase its fertility; *the best method to accomplish this, must be that which leaves a sufficient supply of bearing shoots on the least possible proportionate quantity of old wood.*

It will be necessary now to examine which of the three methods of pruning, before mentioned, agrees best with the principle here laid down. First, therefore, of

The fan method. Vines pruned according to this method, have their branches trained in from their stems in a similar manner to the spokes of a fan. To

this method, there are several objections; the two principal of which, are,—*first*, the shoots in the vicinity of the stem are too near each other to admit of either the wood or fruit being properly matured; and too far distant from each other at their extremities to allow of the fruit being judiciously shaded and protected by the foliage of the adjacent shoots. And *secondly*, a vine pruned to be trained in this manner, must of necessity possess several branches radiating as it were from a common centre. These branches cannot conveniently be trained otherwise than in straight lines, and betwixt a horizontal and a vertical position, which is the most objectionable position that the *fruiting* shoots of a vine can occupy, because the ascent of the sap is thereby facilitated; in consequence of which, all the lowermost buds break very weakly, and some not at all, while the sap flies with such force to the extremities, that scarcely any good bearing shoots can be made to grow from the vicinity of the stem. This necessarily causes the retention of old naked wood at the autumnal pruning, and this annually increasing in distance from the stem, no species of pruning will prevent it occupying, in a short time, a disproportionate extent of the surface of the wall, and causing all the fruit to be borne at the extremities of the branches. Other objections might be urged, but the foregoing sufficiently show that without very disadvantageous results, vines cannot be pruned to be trained in the fruit-tree method.

Spur pruning. This is the usual method adopted throughout the country in the pruning of vines; but although almost universally practiced, it is calculated in a high degree to create a large scaffolding or superstructure of old naked wood. A *spur* may be defined to be a shoot, shortened so as to contain not more than *four* buds. If a shoot contain *five* buds, it can-

not with propriety be called a spur. Spur pruning, therefore, is the annual shortening of the fruit-bearing shoots of a vine, so that each shall contain not more than four buds. This being premised, it will be necessary to point out in as distinct a manner as possible, the disadvantages attending this method of pruning a vine.

First, every shoot that is sufficiently large to bear fruit, emitted by an established vine, if it be trained at full length throughout the summer, in the manner hereafter mentioned in the chapter on training, will produce at least *twenty* good well-ripened fruit buds, and each of these in the following year will produce on an average *two* bunches of grapes, so that a shoot of this description will bear *forty* bunches. Now, if a shoot be shortened to *three* buds, which is the number that spurs, on an average, usually contain, two of these will be almost useless, being but imperfectly formed, and therefore seldom producing fruit. Only the uppermost bud can be depended upon to shew fruit; and consequently, in order to ensure the production of as many bunches of fruit as the single shoot will bear, not less than twenty spurs must be provided. This is the parent of many evils. *First*, these spurs, if joined together, would be nearly three times the length of the single shoot; the surface of the wall, therefore, which they occupy, will yield only one third of the quantity of fruit produced from that on which the single shoot is trained. *Secondly*, the latter can be nailed to the wall with *five* nails, whereas the twenty spurs will require *twenty* nails, and as many holes will be made in the joints of the wall by driving them in. This evil is not a light one. Moreover, a fourfold degree of trouble and time will be required to nail and unnail these spurs, beyond that necessary for the single shoot. *Thirdly*, the

fruit produced from the latter will be far superior, both in size and flavor, to that borne by the spurs, for this reason,—the best grapes are uniformly produced from the fullest sized and best ripened buds, and these are generated on the shoots from the beginning of May to the middle of July, and in moderately vigorous vines, range in order on each shoot from the fourth bud to about the twentieth; but if a vine be well established and very vigorous in its growth, it will, under a judicious system of pruning, produce on a single shoot, from twenty-five to thirty buds, within that space of time. If a shoot be spurred, therefore, to *three* buds, it will contain *none*, and if to *four*, only *one* of these well ripened buds, all the rest will have been cut off in the pruning, or, what is tantamount to it, the shoots will have been pinched back in the early part of the summer, just as the vine was entering its most vigorous state of vegetation, and about to generate the very best description of fruit buds.

Secondly, the cutting down of the single shoot in autumn to one or two buds, in order that it may produce in the next summer a strong and vigorous shoot to be reserved as a fruit bearer, occasions to the vine only *one* wound, but the pruning of the three shoots that have pushed from each of the spurs will occasion *sixty* wounds. This is another most serious evil, for though a vine from its inherent nature commands an immense volume of sap, and can therefore easily overcome a wound here and there inflicted by the pruning knife, it does not follow that it can overcome these wounds when they are multiplied by scores, and even by hundreds, without making such extraordinary efforts as would materially compromise its vital energies. The fact is, that the immense number of wounds caused by spur pruning are highly injurious to the health of a vine.

If any doubt be entertained on this point, let a shoot that has been spurred five or six years successively, be taken and slit open lengthwise, and it will be seen distinctly that the union which has annually taken place betwixt the older and younger wood, has not been effected without a considerable effort on the part of the vine. At the points of union, the sap vessels will be all crippled, and in some instances the wood will be found to have died back nearly to the centre of the shoot; and the sap being intercepted at so many points in its ascent, flows through the parent limb to the extreme horizontal shoots, thereby generating the most vigorous bearing wood at a great distance from the stem of the vine. The proper juice of the plant is also in its descent, very uselessly expended in vainly endeavoring to cover with a new alburnum these numerous scars made by the pruning knife, around the edges of which it accumulates in considerable quantity.

Moreover, although by pruning a vine its fertility is increased, its existence is no doubt thereby shortened. The severing of a healthy branch from any tree is, without doubt, doing an act of violence to it, the effects of which are only overcome by the superior strength of the vegetative powers of its roots. By annually making many scores of amputations in a vine, therefore, the energies of the roots become paralyzed, and the efforts which nature is compelled to make for self-preservation are such as to affect to a considerable extent the vital powers of the plant.

Thirdly, by adopting the spur system in the pruning of a vine, the old branches *must* be retained, because it is on these that the spurs are formed. These branches being annually lengthened, and new spurs created at their extremities, while the former spurs become longer and more naked every year, the vine

in a few years contains an immense assemblage of old naked limbs, presenting the most unsightly appearance imaginable, and occupying the surface of the wall to the entire exclusion of young bearing shoots. The disadvantages of retaining old wood having been already pointed out, it is only necessary further to observe, that these disadvantages are produced to the greatest possible extent by spur pruning. For the foregoing reasons, therefore, this method may be considered the most objectionable that can be adopted in the pruning of vines on open walls. It may, perhaps, be practiced with success on vines under glass, and also in warmer climates, because in such cases the sap, being far more highly elaborated, will produce fruit from the buds seated at the base of the spurs. Such spurs, therefore, need not be more than from half an inch to an inch in length, and they may with ease be retained for several successive years without becoming much longer. The results of spur pruning under such circumstances, are very different from those which follow that method when practiced on vines trained on the open wall in this country.

Long pruning. This method consists in obtaining all the fruit of a vine from a few shoots, trained at full length, instead of from a great number of spurs or short shoots. To provide these shoots, the former bearers are cut down to very short spurs at the autumnal pruning, and at the same time a sufficient number of shoots are left at whole length to produce fruit in the following year; at the succeeding autumn these latter are cut down to very short spurs, and the long shoots that have pushed from the spurs are trained at whole length as before, and so on annually in alternate succession. This method recommends itself by its simplicity; by the old wood

of the vine being annually got rid of; by the small number of wounds inflicted in the pruning; by the clear and handsome appearance of the vine; and by the great ease with which it is managed, in consequence of its occupying but a small portion of the surface of the wall. These characteristics of long pruning are sufficient to make that method superior to every other. As the details of it are given more fully in the two following chapters, it is not necessary to describe it further here. Before entering on the subject of trainings, a few general rules may be advantageously laid down for the guidance of the pruner.

1st. In pruning, always cut upwards and in a sloping direction.

2d. Always leave an inch of blank wood beyond a terminal bud, and let the cut be on the opposite side of the bud.

3d. Prune so as to leave as few wounds as possible, and let the surface of every cut be perfectly smooth.

4th. In cutting out an old branch, prune it even with the parent limb, that the wound may quickly heal.

5th. Prune so as to obtain the quantity of fruit desired on the smallest number of shoots possible.

6th. Never prune in frosty weather, nor when a frost is expected.

7th. Never prune in the months of March, April, or May. Pruning in either of these months causes bleeding, and occasions thereby a wasteful and an injurious expenditure of sap.

8th. Let the general autumnal pruning take place as soon after the first of October as the gathering of the fruit will permit.

Lastly, use a pruning knife of the best description, and let it be, if possible, as sharp as a razor.

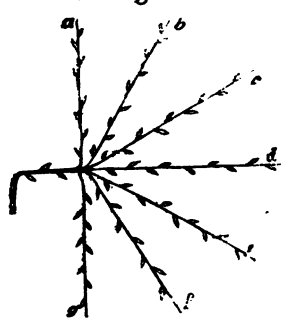
CHAPTER X.

ON THE TRAINING OF VINES.

To train a vine on the surface of a wall, is to regulate the position of its branches, the principal objects of which are, to protect them from the influence of the wind; to bring them into close contact with the wall for the purpose of receiving the benefit of its warmth; to spread them at proper distances from each other, that the foliage and fruit may receive the full effect of the sun's rays; and to retard the motion of the sap for the purpose of inducing the formation of fruit buds.

The flow of sap, it must be remembered, is always strongest in a vertical direction, and weakest in a downward one; thus, if a shoot be trained in the direction of *a*, fig. 1, the sap will ascend with the

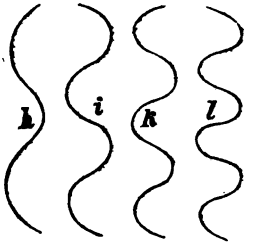
Fig. 1.



greatest degree of force with which the strength of the roots can propel it; if it be trained in the direction of *b*, *c*, or *d*, that force will be gradually diminished as the shoot approaches the horizontal position

of *d*; nevertheless, the difference in the flow of the sap betwixt the shoot at *a*, and that at *d*, will not be very great. Immediately, however, the horizontal line *d* is passed, and the shoot depressed below it in the direction of *e*, the sap receives a considerable check, and the shoots that push from it are proportionately weak. If trained in the direction of *f*, they will be weaker still, and if directly downwards, as at *g*, the supply of sap will be barely sufficient to mature the fruit. And further, if the shoot, instead of being trained in a straight line, be bent in a crooked or serpentine manner, the flow of the sap will be additionally retarded. Thus, if it be trained in a serpentine manner resembling the line *h*, fig. 2, the sap

Fig. 2.

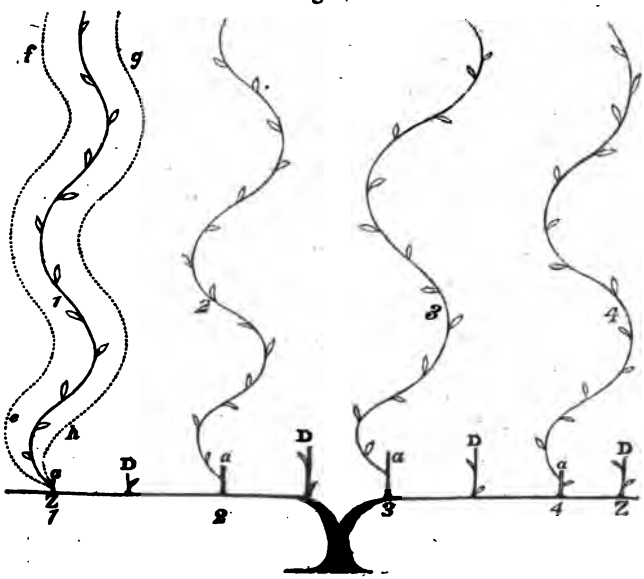


will flow slower than if trained in a straight line; if like the lines *i*, *k*, *l*, successively slower, the degree of slowness increasing in proportion to the number of bends or curves which the shoot is made to assume. If, therefore, the shoot *g*, fig. 1, be closely serpentined in the manner of the line *l*, fig. 2, the sap will be so retarded that many of the buds will not burst at all.

Now, to apply to a practical purpose this principle of retarding the ascent of the sap, by depressing or serpentining the shoots of a vine, it will be convenient to treat of it in reference to winter training and summer training.

Winter training. When the shoots are nailed to the wall in the early part of the year, those which are trained at full length as fruit-bearers are, in all cases, to be cut down to the lowermost bud or two at the next autumnal pruning. With respect, therefore, to all such shoots, no greater supply of sap should be permitted to flow into them than is necessary to mature their fruit, as all above that quantity will be so much nourishment uselessly expended, and taken indeed from the young shoots that are to be produced in the current year for future bearers. For example, if the shoots 1, 2, 3, 4, fig. 3, were

Fig. 3.



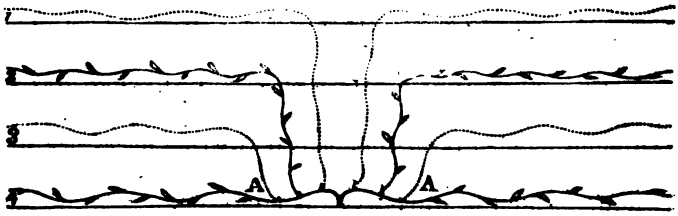
trained in straight lines, the sap would ascend with such force that many of the lowermost buds would

scarcely break at all, the sap passing by them, and accumulating in those at the upper part of the shoots, which would burst with great force and form very strong shoots; these would rob all the fruit on those below of its due share of nourishment, and also the shoots emitted from the spurs D; which, to form good bearing wood require as great a supply as the fruiting shoots. It is true that, by pinching off the extremities of these latter ones in the spring an eye or two above the last bunch of fruit, the sap will be partially kept back, but the ascending current having set in very strongly, it cannot be diverted into the other channels in which it is required, except in a comparatively trifling degree. But if, as represented in the above figure, the shoots be trained in a serpentine manner in the early part of the year, before the sap is in motion, it will, in its ascent, be thereby made to flow more equally into all the fruiting shoots that push from them, and also into those which will be emitted from the spurs D, for future bearers. And by bending the bottom part of the shoots pretty circularly at *a*, the buds will there burst strongly, and thus a good supply of bearing wood will be obtained close to the arms Z Z, which is of primary importance; for, if by injudicious pruning or training, or both combined, the sap have an opportunity of exerting its full force at a distance from the arms, it is sure to embrace it, and the consequence is, that blank wood begins immediately to be formed in all directions near the stem, and when that is the case, no method of pruning will ever again procure a supply of bearing wood at home, short of cutting the vine down to a perfect stump. In training the shoots 1, 2, 3, 4, the spaces between them must be regulated by the number of shoots intended to be trained up from the spurs D. Each of these latter will require

five inches of clear space on each side of it, and the former *nine*, for the fruiting shoots, (as represented by the dotted lines *e f g h* at the shoot 1.) These shoots producing on an average two bunches each, are to be topped one joint beyond the last bunch, as directed in the Calendarial Register.

For the foregoing reasons, therefore, the method of serpentine training may be considered preferable to every other, being calculated in a greater degree to check the too rapid ascent of the sap, and to make it flow more equally into the fruiting shoots and those intended for future bearers. On walls that are much less than five feet high, a portion of the shoots must be trained horizontally. Let fig. 4 represent a wall four feet high, and let the face of it be divided into

Fig. 4



equal parallel portions of twelve inches in height by the horizontal lines 1, 2, 3, 4; then, on each side of the stem, from the arms A, A, may be trained two fruiting shoots at 2 and 4, and the same number of current year's shoots at the dotted lines above 1 and 3. And in like manner, half that number of shoots may be easily trained on a wall two feet high. The pruning in these cases will be precisely the same as if the shoots were trained vertically, as in fig. 3. In a similar manner, also, a series of vines may be trained on a high wall allowing to each a certain parallel space in a horizontal direction, and running the

stems to such heights as the arms of each vine are to be trained. And when the height of a wall exceeds eight or nine feet, this method may be adopted with great advantage; for by planting the vines sufficiently close to each other, the surface of the wall may in a few years be completely covered with fruit and bearing wood.

It must be remarked, in reference to the winter training of the shoots, that when they are trained in a horizontal manner, there is not that necessity for serpentining them as when they are trained vertically; unless the vegetation of the vine be so extremely vigorous, as to generate wild or long-jointed wood. It may also be further mentioned, that every shoot trained in a serpentine manner, ought to be wholly cut down at the next autumnal pruning after it has borne fruit, as the further retention of it would produce great confusion in the future training of the shoots.

Summer training. In order that the *principles* on which this important point of culture is based should be clearly understood, it will be necessary to point out as distinctly as possible, the circumstances under which bearing wood is produced.

It must be borne in mind, that the fruit of the vine is produced on shoots of the preceding year's growth, or, in other words, the grapes that are grown in the present year 1834, are produced from shoots grown in 1833. Now, during the growth of a current year's shoot, all the buds, which it develops previously to the month of August, will be fruit buds, provided, *first*,—that the size of the shoot be large enough for its vessels to convey a sufficient quantity of the juices of the plant to generate and nourish bunches of fruit in embryo; and *secondly*,—that the shoot be duly exposed to light, and to the full ope-

ration of the sun's rays, on the surface of a wall, having any aspect south of and including the eastern and western points of the horizon, by which these juices will be elaborated, and the process of the formation of fruit buds thereby completed. If, therefore, the shoot itself be not sufficiently large to develop fruit buds, or if, being so, it be shaded from the sun's rays during the first protrusion and early formation of them, then, in the following year, shoots only will be produced, but no fruit. But, on the contrary, if the shoot, being of a proper fruit-bearing size, be constantly trained on the surface of a wall having any of the aspects before-mentioned, and a clear space of five inches be left on each side of it, by which no adjacent foliage will shade it; then, under these circumstances, every bud (except the two first) produced previously to the month already named, will be a fruit bud, and will shew accordingly, when it unfolds in the following year, one or more bunches of grapes.

The cause of the production of fruit buds in the latter instance, and of their non-production in the former, may be thus further explained. As the shoot is progressively developed, if it be shaded by any adjacent foliage, the sap of the shaded part remains in its original thin and watery state, being excluded from the sun's rays, which are necessary to warm and elaborate it, and thereby prepare it for the development of bunches of fruit in embryo. The sap being thus thin and watery for want of due exposure to the sun, pushes on, with amazing quickness,—the shoot elongating itself on the surface of the wall much more rapidly than it otherwise would do, thereby forming long jointed wood, not one bud of which will be sufficiently matured to produce fruit; the principle of *growth* having been in full operation, but

that of *maturation* having remained dormant. But if the shoot be trained on the wall, and exposed to the full power of the solar rays in the manner already mentioned, the sap, by being warmed, becomes thickened, or, as it is termed, inspissated, in which state it accumulates at the joints of the shoot, and expends itself in the formation of fruit buds. In this case the principles of *growth* and of *maturation*, will have been in active co-operation.

I have had good grapes produced from buds, formed as late as the beginning of September in a favorable season, and also from shoots trained within three inches of each other, as well as on aspects considerably north of the eastern and western points of the horizon; but as there is some degree of uncertainty attached in these cases, they are rejected in the rule, lest the practical operation of it might in some instances be productive of disappointment.

I know of no exception to this rule for procuring the development and formation of fruit buds, except in the case of a vine having been overcropped, or in that of an exceedingly vigorous growth of the shoots, the result of the soil being too highly manured. But the former can never happen, if the quantity of fruit borne by the vine be proportioned to its capacity of maturation, agreeably to the scale given in the former part of this work; and the latter can be easily remedied by training the shoots in a curved direction. Indeed, the principle of retarding the flow of the sap, by curving or depressing the shoots, may be applied with as much advantage to the training of the summer shoots of a vine, as to that of the shoots grown in the preceding year. For, although, by training the summer shoots in the manner before-mentioned, all the buds developed will be fruit buds, and the number and size of their bunches be, in a great

measure, regulated by the duration and intensity of the solar rays they enjoyed during their formation; yet the number, and more especially the *size* of the bunches of fruit produced from a bud, can, without doubt, be further increased by the application of this principle. If a summer shoot, therefore, every time it is nailed throughout the season, be bent or pointed in a different direction to that in which it grew at the preceding nailing, the vigor of its growth will be checked, and the sap will immediately accumulate, and expend itself in forming round short jointed wood, and in the development of the finest description of fruit buds. This is the key to the production of *large* bunches of fruit, which are not the necessary consequence of very large sized bearing shoots, but rather of sap that has been accumulated, and highly elaborated by slowness of growth, in combination with full exposure to the sun's rays.

Sufficient has now been said, to shew the principles by which the training of the summer shoots of a vine that are reserved as future bearers, must be regulated throughout the season. They are simple, and of easy practical application; and it is evident, that by conforming to them, abundant crops of grapes are always at the command of the cultivator.

Ample details of the routine of summer training being given in the Calendarial Register, it only remains in closing this chapter, to say a few words in reference to the *nailing* of the shoots to the wall. Linen or cotton shreds are the best that can be used for this purpose; woolen ones being too thick, and also too retentive of moisture. But if woolen shreds be used, those cut from old cloth are better than those from new, as the latter abound with oil, and are therefore pernicious, especially to the summer shoots.

Strength, thinness, and openness of texture, are

qualities necessary to form a good shred, and these will be found combined in a much greater degree in linen or cotton fabrics, than in those made of wool. The shreds should be from three quarters of an inch, to an inch and a half in breadth, according to the size of the shoot to be nailed; and they should be cut sufficiently long to admit of space enough being left for the shoots freely to swell in, after they are encircled by the shreds. It must not be forgotten, that the covering of portions of the branches with shreds, and thereby preventing them from receiving the benefit of the sun and air, is, to a certain extent, a direct injury to the vegetation of the vine, and is only resorted to because there are no other means by which the branches can be confined in their position on the wall so as to receive the benefit of its warmth by close contact. Bearing this in mind, therefore, care should be taken never to use more shreds, nor any of a greater breadth, than are necessary to secure the branches in a firm and effectual manner.

CHAPTER XI.

ON THE MANAGEMENT OF A VINE DURING THE FIRST FIVE YEARS OF ITS GROWTH.

As the routine of practice hereafter given in the Calendarial Register applies more particularly to vines that are well established, and in full bearing, it is necessary that some practical directions should be given for the management of *young* vines, until they arrive at such a state of growth as to admit of their

being subjected to a regular course of pruning and training. Previously, however, to doing this, some observations relative to the *transplanting* of vine may perhaps not be unacceptable.

The best time of the year to transplant a vine, is immediately after the fall of the leaf; the longer its removal is postponed after this period, the later in the ensuing spring does it begin to vegetate. The ground in which it is to be planted, must be prepared agreeably to the direction given in the chapter on soil. This being done, dig a hole for the reception of the vine, about two feet deep, and of the same width and length; and if, after the plant is taken up, its roots should prove too long for this, the size of the hole must be increased, as on no account must the roots be crippled in their extension. Loosen the sides and bottom of the hole, and to the soil that is taken out, add a couple of spits of well rotted dung, and mix the whole well together, making it very fine. Put the mould into the hole again to within nine inches of the top, and it will be ready to receive the vine. This must be now carefully taken up, with its roots as entire as possible, and if any of them be bruised or in any way injured, they must be pruned back to the sound parts; fix the vine in the hole with its stem about three inches from the wall, and let the bottom bud be just even with the surface of the ground. Spread the roots out in a horizontal direction at equal distances from each other, and in a similar manner to the spokes of a fan, and then fill the hole with the mould nearly to the top. Take hold of the stem, and, drawing it upwards a little, give it two or three good shakes with the hand, that the mould may setttle well round the roots; after which, fill up the hole with the remainder of the

mould, cut the vine down to the two bottom buds, and the operation will be completed.

If the vine have been raised in a pot, the roots will most probably be matted together, in which case they must be freed from the mould by having it shaken entirely off; and if any of them should have grown in an adverse direction, so as to cross each other, or in any way that is likely to interfere with their future growth, which is frequently the case with the roots of vines raised in pots, all such must be cut completely out close to the part whence they have sprung. Also, such of the roots as are very taper and long, and that appear to have been over excited in their growth, prune back to within a foot of the stem, or to such parts as appear to be sufficiently strong and healthy to generate new fibres. Transplanting should always be done in dry and still weather, and when the soil works freely. During the removal of a vine, the roots must be carefully kept from exposure to the atmosphere, the influence of which would dry up their tender extremities and cause them to perish. The better way is, never to take up a young vine about to be transplanted until its new residence be prepared to receive it, and then let its removal be effected as quickly as possible.

Assuming now that the vine thus transplanted is a young one, it may be considered equal in its growth to one raised from a layer or cutting in the preceding summer; and as ample directions have already been given for the management of a vine during its first summer's growth, its future culture will be here taken up at the autumn of the first year, and after it has been cut down to the two lowermost buds, as directed in the chapter on the propagation of vines.

First year. December 1. As long as the weather remains open, the soil round the roots should not

be covered over, but as soon as frost comes, a good covering of litter or of well rotted stable manure must be laid over the ground as far as the roots extend, and if the weather be very severe, it will be better also to cover over the stem to the depth of five or six inches above the top of it. The young plant being thus well protected from the severity of the winter, may remain in this state till the first of March.

Second year. March 1. Remove the covering and fork up the surface of the ground to the depth of two or three inches, that the sun and air may freely penetrate it.

April 1. Keep the soil round the roots free from weeds, and the surface of it loose, either by raking or forking it up as often as necessary.

May 1. Now remember that only a single shoot is permanently to be trained throughout the summer, the object of leaving two buds in the previous autumn being to provide against the loss of a shoot in case of any accident. As soon, therefore, as the strongest has grown sufficiently to be out of danger of being accidentally rubbed off, the other is to be cut out as hereafter directed. If any other shoots have pushed besides the two principal ones, rub them all off. As soon as the shoots have grown about a foot in length, nail them to the wall. Do this very carefully, for they are as yet extremely tender. When they have grown about six inches from the last nailing, they must again be nailed, and continually kept so, never suffering the tops of the shoot to be blown about by the wind. As the tendrils and lateral shoots successively appear throughout the summer, pinch off the former when they have grown about three or four inches in length and the latter to an inch beyond the first eye.

June 1. Throughout this month and the two

following ones, whenever the ground appears parched through the heat of the weather, give the roots, once a day, about half a gallon of soap-suds or dung-water. Keep the ground free from weeds and the surface loose and open, by raking or forking it up once a week throughout the summer.

July 1. The young shoots being firmly united to the preceding year's wood, and therefore past all danger of being broken off by any accident, unnail the weakest shoot of the two, and cut it out close to the stem, making the surface of the wound quite smooth and even. The remaining shoot must be kept nailed to the wall as before directed.

November 1. Cut the vine down to the two lowermost buds, and in the winter, if the weather be frosty, cover the ground over in the same manner as in the preceding winter.

Third year, March 1. Remove the winter covering, and fork up the surface of the ground, and let the subsequent management throughout the season be precisely the same as in the preceding summer. If any fruit be shown, pinch it off immediately it appears.

November 1. The stem of the vine will now be more than two inches in girth, and therefore *two* leading shoots are to be permanently retained in the next year. For this purpose, cut the vine down now to the *three* lowermost buds, thus reserving, as before, one to spare in case of accident. The vine will then resemble fig. 5. The roots being now suffi-

Fig 5.

ciently strong to withstand the severity of the weather, will not in future require to be covered.

Fourth year, March 1. Clean the surface of ground and fork it up lightly, and let the subsequent management throughout the season be the same as before, unless directed otherwise.

May 1. As soon as the shoots have attained a sufficient length, nail them carefully to the wall, and rub off all others, if any should have pushed. If fruit be shown, pinch it off as in the preceding year.

July 1. Unnail and cut out the weakest of the three shoots, and train the two remaining ones carefully during the remainder of the season.

September 1. Pinch off the tops of the shoots.

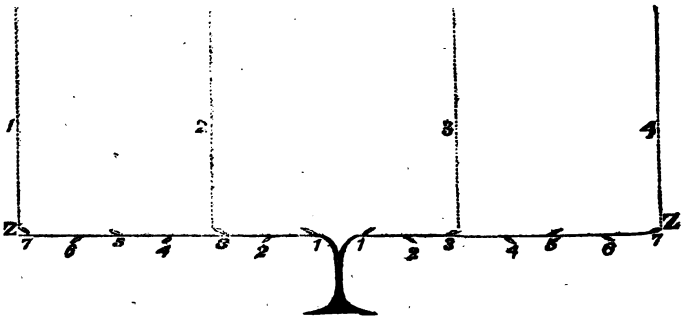
November 1. As the girth of the stem will not be less now than three inches, the vine may be permitted to mature fruit the next year, not exceeding five pounds weight. For this purpose, cut down the two shoots to the *seven lowest buds each;* prune away the remaining portions of the tendrils and dead wood close to the shoots; and cut out carefully all the lateral shoots close to the base of the buds, whence they have sprung. If the outer bark of the stem be decayed, peel it off clean; and then nail the shoots to the wall in a temporary manner.

Fifth year, February 1. As soon after this time as the weather is open, cut out of each shoot the *first*, *second*, *fourth*, *fifth*, and *sixth* buds; then bend the two shoots carefully down, and secure them in a horizontal position, similar to that represented by the shoots Z Z fig. 6.

March 1. Clean the surface of the ground, and fork it up as in the preceding year.

May 1. Train the shoots that push from the shoots 3 and 7, in the manner represented by the dotted lines 1, 2, 3, and 4, and if more fruit shows than

Fig. 6.



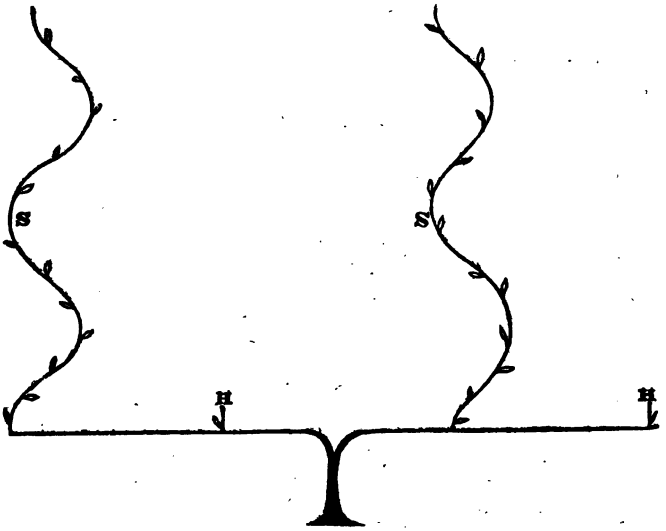
is equivalent to the weight before mentioned, the excess must be cut off when the berries are set, as directed in the Calendarial Register, July 15. Continue the same course of management as in the preceding year, and when the roots require watering, they are now sufficiently strong to have applied to them for that purpose any description of liquid manure that can be most conveniently obtained.

September 1. Pinch off the tops of the shoots, and the sap will then accumulate in the buds.

October 1. As soon after this time as the fruit is gathered, cut back the *first* and *third* shoots to as many buds as may be deemed necessary to produce the quantity of fruit which the vine can mature in the next year; aud the *second* and *fourth* shoots to the lowest bud each. Cut out the lateral shoots and the stumps of the tendrils, as directed in the preceding year, and peel or scrape off all loose and decayed bark; then nail the shoots temporarily to the wall to protect them throughout the winter.

Sixth year. March 1. Train the two shoots in the manner represented by S S fig. 7; and as those push from the spurs H H, train them also in a similar form. Clean the surface of the ground, and fork

Fig. 7.



it up as in the preceding year. The Calendarial Register will now supply the details of the future management.

The vine has now assumed the form which it is permanently to retain, and the manner in which it is trained, may be considered as the commencement of a system of alternately fruiting two shoots, and training two at full length for bearing wood in the following year; which method may be continued every year without any alteration, until the capacity of the vine is equal to the maturation of more fruit than can possibly be borne by two single shoots; which, on an average, may be estimated at sixty pounds weight annually. Several years must elapse before this will be the case; but when it is, the arms may be easily lengthened by the training in of a shoot at

their extremities, and managing it in the same manner as when the arms of the vine were first formed. It is very advisable, however, that the vine should not be suffered to extend itself further on the wall; for in such case, the bearing shoots emitted from the centre are sure to decline in strength; whereas, by confining the dimensions of the vine to a single arm on each side of the stem, and each arm to the support and nourishment of two branches only, the very best description of bearing shoots never fails to be generated close at home; and these, as the vine advances in age, become prolific almost beyond conception. I have often ripened as many as seven full-sized bunches of grapes on two shoots which have pushed from a single bud, on vines managed in this manner. Indeed, those who have been accustomed to permit their vines to cover a large space of walling, and to possess a great number of branches, can scarcely imagine how much easier a vine is managed, and with what certainty the fruit is increased in quantity, and improved in quality, when it is kept within a small compass on the surface of the wall.

Moreover, there cannot be the slightest reason given why vines should be encouraged to spread over the extent of surface which they usually do; their propagation being so easy, that a wall, however long or high, may be entirely covered with fruit and bearing wood in the space of six or seven years, provided the vines are planted sufficiently near to each other. The roots of vines do not prejudice each other by running together; but, on the contrary, rather serve to prevent any redundancy of moisture in the soil by more fully occupying it, and to cause the shoots to be less luxuriant in their growth, than if they enjoyed a more extensive range for food: and this, without doubt, will increase their fertility.

I have planted vines within eighteen inches of each other for the purpose of speedily filling a wall; and they thrive and produce as fine grapes as if planted as many yards apart. The distance, therefore, at which vines may be planted from each other, need have but little reference to the space which their roots will occupy in the border, but rather to the surface of the wall on which the branches are to be trained. A vine trained as represented by fig. 7, will stretch its two arms about five feet in length; and if ten feet in height be set apart for the shoots to be trained on, the whole surface required will be fifty square feet. Now, the annual increase in the girth of the stem of a vine planted in good ground, will be found on an average, after it comes to be fruited regularly, to be about half an inch; which gives an increase in its powers of maturation equal to five pounds weight of fruit; and if sixty pounds be estimated as the greatest quantity which can annually be obtained from a vine confined within this space, it will appear that if a cutting be planted, it will be fifteen or sixteen years before it can be expected to arrive at such a degree of strength as to be able to mature that quantity of fruit. This space of time is so great, that it seems highly desirable to shorten it. And this is easily done by allowing to each vine when first planted no more than half this portion of the surface of the wall; namely: twenty-five square feet for the training of the branches; and when it has attained such a degree of strength that its shoots cannot be kept within the limits of that space, let every alternate vine be cut out. If the wall, therefore, be ten feet high, plant the vines two feet and a half apart, and appropriate to each vine the five lower feet of the surface and the five upper, in alternate succession. To form the stems of those destined for the upper

portion of the wall, instead of cutting down the vine in the autumn of the third year of its growth to the three lowest buds, cut out all the buds on the shoot to the height of five feet from the ground, and select the three next buds to obtain the two shoots for the arms. And if the wall be seven or eight feet high, plant the vines about three feet and a half apart, and train every alternate one similar to fig. 7, and the others in a horizontal manner, resembling fig. 4. If the summer shoots during their growth interfere with each other, the remedy is easy. From the flexibility of the shoots of the vine, they can be trained in any manner that convenience may dictate; and the more they are bent and curved about, the more fruitful do they become. It is this property, indeed, that enables the skillful cultivator to cover the face of a wall with full crops of grapes in a much shorter space of time, and with a far greater degree of certainty, than can be done in respect to any other description of fruit.

CHAPTER XII.

WEEKLY CALENDARIAL REGISTER.

This comprehends the practical details of the management* of a vine, from the bursting of the bud to the fall of the leaf.

* The operations directed in the following Register, to be performed on or about the respective days named, are applicable to a medium aspect, a season moderately favorable to the culture of the vine, and to latitude 50¾ degrees north. In a very favorable aspect, or season, therefore, or in a latitude farther south, the different stages in the growth of the shoots, &c., of a vine as indicated in the Regis-

April 1. This is one of the most interesting periods of the year to observe the vine. The plant having been apparently in a state of rest for several months, now begins to awake from its slumber, and the buds will be seen swelling with eagerness to escape from their winter habitation. Examine them all carefully, to see if any are impeded in their growth, in consequence of the shoots having been nailed too closely to the wall or otherwise. All such buds must be immediately relieved, by cutting the shreds which confine them, or by putting small bits of wood, or other convenient things, betwixt the shoots and the wall, and thereby making a space for the buds to swell in. In dry weather, fork up the border to the depth of a couple of inches, that it may be loose and open, to receive the full benefit of the sun and air.

8th. The buds will now be sufficiently unfolded to shew the extremities of the first bunches of fruit peeping out betwixt the beautiful crimson edges of the embryo leaves. Look carefully again over all the buds, and if any be confined and have not sufficient room to push their shoots freely, give them relief immediately.

15th. Some of the buds will be now unfolded two or three inches in length, and the leaves, as they increase in size, will part with their variegated tints and gradually assume their permanent colors. The small buds which frequently accompany the principal ones, should now be rubbed off.

22d. Such shoots as have grown four or five

ter, will occur a little earlier; while, on the contrary, if the aspect or season be unfavorable, or the latitude be much farther north, they will be found to take place a few days later. It may be remarked, also, that the directions for management are intended to be of general application, and not to refer exclusively to a vine pruned or trained in any particular manner.

inches in length, will show all the bunches of fruit which they will bear in the current season. Continue to examine the young shoots to see if any of them are crippled or obstructed in their growth, and if so, give the necessary relief.

29. If any small or secondary buds still remain, rub them off immediately, as they will now impede the growth of the young shoots. If weeds begin to appear in the border, hoe them up, or pull them with the hand, and rake the surface smooth and clean.

May 6th. The shoots will now grow rapidly, and the bunches of fruit unfold in quick succession. Continue to look over the former, and remove anything that may obstruct their growth.

13th. The shoots will now be of sufficient length to be nailed to the wall. With respect to this operation, the rule to be observed is, never to suffer any shoot to grow more than twelve inches without nailing it, to protect it from the injurious effects of the wind, and to give it the benefit of the warmth of the wall by close contact. This operation must be performed very carefully throughout this month, as the young shoots are extremely tender and brittle. There will be many shoots emitted from different parts of the vine, that will neither show fruit nor be of a sufficient size to be retained as future bearers. All such must now be rubbed off, unless foliage be required to cover any adjacent bunches of fruit, in which case pinch the tops off at the second or third joint, and they will not then require to be nailed. In managing the vine throughout the season, be careful to observe this general rule: that every operation in which the shoots, leaves, or fruit are concerned, must be performed when the weather is dry, and after the dew is dissipated in the morning, and before it begins to fall in the evening.

20th. Nail the shoots that shew fruit, and that are intended to be cut out at the next autumnal pruning, sufficiently near to each other, to cause their leaves, when they attain their full size, to form a continued unbroken surface, which will be hereafter of the greatest service in protecting and maturing the fruit. But such shoots as are intended to be trained for future bearers, must have as much of the clear surface of the wall to themselves as possible, never less, indeed, than five inches on each side of every shoot.

The whole crop of grapes will have been shewn previously to this time. During the last three or four weeks, the leafing of the vine and the unfolding of the bunches of fruit in rapid succession, will have presented a sight of the most pleasing and gratifying nature. If the cultivator has not during the preceding year imposed on the vine the task of ripening a greater quantity of fruit than its strength would permit, without encroaching too much on its vital energies, and has subsequently used the pruning knife in a skillful manner, he will now be rewarded with the prospect of not only an abundant, but most probably, an overflowing crop. Many shoots will show three bunches of fruit, and here and there, on some will be found even four.

27th. The shoots will now push so rapidly as to require almost daily inspection. Nail the future bearers firmly, and if any of them be disposed to grow long-jointed, bend them a little out of their former direction every time they are nailed; this will soon check their growth and ensure the development of full-sized fruit-buds. Some of the strongest shoots will perhaps grow in an adverse direction to the surface of the wall; if so, these must be managed at the outset with more than ordinary care. For the

purpose of inducing them to grow close to the wall, provide a sufficient number of shreds from twelve to eighteen inches in length, or longer if required; and as soon as any shoot which has thus pushed, has attained the length of fifteen or not more than eighteen inches, put a shred, sufficiently long, carefully round that part of it that is nine or ten inches from the old wood out of which it has grown, and drawing it out of its natural position about an inch towards the wall, nail it firmly. In the course of two or three days the shoots will have taken a direction towards the wall; it may then have another shred put round it, much shorter than the first, and somewhat nearer the extremity of the shoot. Repeat this operation two or three days afterwards if required, and the shoot will then grow close to the surface of the wall.

The *tendrils* that push from the footstalks of the bunches of fruit, must now be pinched off.

The *lateral* or *side shoots*, also, which are now pushing vigorously, must be pinched off about an inch beyond the first joint, as soon as they are about *four* inches in length, but such as are near any bunches of fruit, should not be thus topped, till they are about *six* inches in length, as their foliage will then be of greater use in protecting the fruit. It must be observed, that the lateral shoots are not on any account to be pulled off, as they are intimately connected with the organization of the buds; being evidently intended to carry off the superabundant sap generated at the joints of the shoots, and to return to them an increased portion of elaborated juice.

June 3d. The *tendrils* will now grow rapidly, and must therefore be attended to without delay. As soon as they are about six inches long, pinch them off to within about half an inch of the shoots. If neg-

lected, they will in a shor ttime entwine themselves round the adjacent shoots, and cripple them.

Keep the surface of the border open, and free from weeds, as before directed.

Now, as the comparative size and vigor of the young shoots will be distinctly seen, select for future bearers the largest and most vigorous shoots, and such as are round and short-jointed, and that are appropriately situated nearest the stem of the vine. Nail all such very firmly to the wall; and as before directed, suffer no other shoot of any description to be trained within five inches of any one of these. On the careful observance of this point of culture depends the certainty of the next year's crop.

This is the earliest period that any part of the old wood of the vine can be cut out without the risk of bleeding. If, therefore, too much of the preceding year's wood has been inadvertantly nailed in, or if any other cause exist, that may render it necessary to take off any of the principal limbs of the vine, they may now be cut out with safety.

10th. As the shoots will now be pushing with the utmost vigor, all such as have fruit on them, and that are not intended to be retained for future bearers, must be pinched off about an inch beyond the first joint above the last bunch of fruit. The object in view in doing this, is to prevent, as much as possible, any unnecessary expenditure of sap, and also to cause it to flow with greater force into the fruit, and the future bearing shoots. This operation being performed, all nailing will now cease, except that required for the future bearers. If any useless shoots are to be found in any part of the vine, rub them off immediately.

17th. The vegetation of the vine being now in its highest vigor, daily inspection will be necessary.

The future bearing shoots being in general upwards of three feet in length, and having full sized leaves, the wind has a proportionate power over them, and unless kept firmly nailed to the wall, they will be in great danger of being blown down and broken off, if a high wind should arise. To prevent this, nail them hereafter every nine inches of growth, with strong linen or cotton shreds, doubling the edges over, and driving the nails with considerable force through the four thicknesses. Take care, also, to drive the nails on each side of every shoot in alternate succession, so that no two following nails shall be on the same side of any shoot.

24th. The fruit will now be in blossom, and continue so in succession till the latter part of the next month. During this period, great care must be taken not to touch the bunches, lest this beautiful process of vegetable life be thereby marred, and rendered abortive. Keep the border free from weeds, and the surface loose and open; and look over the vine daily, as it will now be pushing in every direction with the greatest vigor.

The tendrils, also, will grow with surprising rapidity, and quickly curl round and injure the neighboring foliage, unless constantly looked after, and pinched off, as before directed.

July 1. The fruit being now in full blossom, will yield a most delightful fragrance. Take care that the bunches are not handled, nor in any way disturbed till the berries are set.

The lateral shoots which were topped some time since will now be sending forth fresh shoots from their terminal buds. Pinch off all these succession shoots just above their first joints, as before; and if any should hereafter break again, pinch them back in like manner throughout the season.

Pay great attention to the future bearing shoots, and nail them firmly, as directed June 17th.

8th. Continue daily inspection, as the vine will still grow most vigorously, and, if neglected, useless shoots, laterals and tendrils will speedily appear in all parts of it. The bunches first in blossom will now begin to have their berries set.

15th. Keep the border clear of weeds, by hoeing or forking up the surface, which will admit the sun's rays to pass through it, and thereby warm and cherish the surface roots.

The blossoming being now nearly over, the berries will be setting in rapid succession. As soon, therefore, as they have all grown to the size of very small peas, an estimate must be made as near as possible of the weight which the whole crop would ultimately attain if suffered to remain and ripen; and the excess, if any, above the quantity which the vine can mature, agreeably to the scale given in page 37, must be cut off. This is a most important operation, and one that cannot be delayed, without materially compromising the health of the vine. In some instances, the excess perhaps will be but trifling, while in others it will probably be very great. I have frequently had young vines produce from eighty to a hundred full sized bunches of grapes each, which, if matured, would weigh at least sixty pounds; while their individual strength was not equal to the ripening of more than a fourth part of that quantity. In such cases, three bunches out of every four, have been cut off. In reducing the number of bunches, get rid of the smallest, and the ragged and uneven ones, if any, and also all such as hang too far distant from the wall to have the full benefit of the warmth and reflection of it; and select to remain, those which are

largest in size and berry, taking care that they be distributed over the vine as equally as possible.

22d. Now that the bunches have been reduced to their proper number, examine the vine and see if there be any vacancies in the foliage, through which any of the bunches are exposed to the direct rays of the sun; and if so, unnail the adjacent shoots, and renail them in such positions as will effectually shade the fruit. If, however, this cannot conveniently be done, put a long narrow shred round the footstalks of such bunches as are thus exposed, and drawing them gently aside, nail them in a position in which the adjacent leaves will shade them. In doing this, take care not to twist or injure the footstalks, nor draw them too far out of their natural direction, which would derange their functions; as, through these very slender but beautifully constituted organs, must flow the chief part of the nourishment required to bring the fruit to perfection. Observe, also, that in no instance should there be more than the thickness of one leaf to shade the fruit. The solar rays, being thus transmitted through the medium of the leaves, are divested of their scorching effect, and are also modified in such a manner as to operate most beneficially on the swelling of the berries. Grapes that are exposed to the direct operation of the sun's rays, scarcely ever attain their proper size or flavor; while, on the contrary, the finest and most highly flavored fruit will uniformly be found to hang in close contact with the wall. The leaves, also, not only serve as a chastened medium for the solar rays to pass through, but they prevent, in a considerable degree, the heat from escaping from the wall, and as a necessary consequence, make the temperature of the air in which the fruit grows, warmer than that of the atmosphere. They also protect the fruit from

the effects of hail, and from continual heavy rains; which, in the latter part of the season, when it is ripe, are advantages that cannot be too highly appreciated. It may, therefore, be considered as an important, and, indeed, an indispensable point of culture, that all the fruit of a vine ought, from the moment of its coming into blossom till it be ripened and gathered, to be shaded by a surface of continuous single leaves, so that no part of it can be seen by an observer, without pulling them aside. It is true that the shape of the leaves prevents any species of training so disposing them as to present one continued single-leaf surface; but though this point of perfection cannot be attained, yet the nearer you approach to it the better the culture will be.

29th. Pay great attention to the future bearing shoots, which will now be of considerable length, and if not nailed firmly to the wall, will be in danger of being blown down, if a strong wind should arise. If any of them be disposed to grow long jointed, curve them in the training, which, by compressing the sap vessels, will immediately cause the sap to accumulate, and produce short jointed wood.

Keep laterals, tendrils, and useless shoots of every description, in constant check.

The grapes will now be as large as small peas; they must, therefore, be thinned on the bunches without loss of time. For this purpose provide a pair of sharp-pointed scissors, that will cut well at the points; and at this first thinning, commence with the bunches that are the most forward in growth, and reduce the number of berries full one half, cutting out all the smallest, and such as are too close together, so that they may be equally distributed on the bunches.

This thinning of the berries is one of the most

necessary and most beneficial operations in the whole culture of the vine. No grapes can be produced fit for the table without it. It increases the size of the berries, improves their flavor, hastens the period of their ripening by preventing their clustering, enables a vine to mature a much greater weight of fruit, and counteracts in a considerable degree those exhausting effects which the perfecting of it would otherwise produce on the vital energies of the plant. It is a species ef pruning, indeed, and may not improperly be called, pruning of the fruit, in contradistinction to the pruning of the wood. To form a proper estimate of the advantage of thinning the berries, it must be remembered, that during the spring of the year, and until the fruit has blossomed, and is fairly set, the vine has been emitting its shoots principally by the aid of sap generated in it during the preceding year. In doing this, its vital energies have not been taxed in the slightest degree; for, if it had emitted a hundred shoots, and every shoot were a hundred feet long, the vine would not only not be weakened by them, but such shoots would form a certain index to its increased strength and vigor, created by a corresponding extension of its roots. But far different is the case with respect to the production of the fruit, the perfecting of which, from the exhaustion it occasions to the vegetative powers of the plant, may be properly designated as a *task*. Other fruit trees are endowed with the faculty of throwing off to a considerable extent, any excess of fruit which they may show at the commencement of the season, before its size is such as to draw on their vital energies; but no such faculty is possessed by the vine. The absence of this, therefore, must be remedied by the cultivator, on whose knowledge of the extent of the powers of maturation possessed by the

vine, depends entirely the quality of the crop when perfected. Now, the primary object of every cultivator must undoubtedly be, to obtain every year in succession, the most valuable crop possible; and the qualities that confer value on a crop of grapes, are, first, *high flavor;* secondly, *large berries;* thirdly, *large bunches;* and in proportion to the degree in which these three grand requisites are combined, will the crop become really valuable. And, that neither high flavor, nor large sized berries, can be produced without reducing the number of them on the bunches, will appear evident for the following reasons:— the fruit is perfected chiefly through the influence of the atmosphere, as the secreted fluid attracted by it from the wood, is comparatively crude in its nature when it enters the berries: being then distributed through the almost innumerable vessels, which are most appropriately, and indeed most beautifully arranged just within the skins of the berries, it there becomes gradually elaborated, by the processes of evaporation and absorption, which are incessantly carried on through the combined agency of light and and air, stimulated by the direct rays of the sun. And in proportion to the energy with which these processes are conducted, will the berries increase in size and flavor. To generate an energetic action of these processes, therefore, it is necessary that the entire convex surface of every berry should be exposed to the unimpeded influence of the grand agents above mentioned; and this cannot be effected without reducing the number of berries on each bunch by the aid of scissors, to such an extent that they shall not touch each other until fully ripened. Further, it must be borne in mind, that the strength of the vine is not put in requisition in creating the *pulp* of the berries, but in perfecting the *seed.* The former is

the substance on which the latter feeds; the *number* of *seeds*, therefore, which the vine has to nourish, constitutes, in reality, the true measure of its task. And to render the performance of this task as easy as possible, it is not enough that the bunches be reduced in number so as to bring the whole crop within a given weight, but it is also equally necessary that the number of berries should be lessened; by which operation, not only is great relief given to the vital powers of the vine during the maturation of the fruit, but the value of the crop becomes thereby doubled, and in many instances quadrupled, in consequence of the extraordinary increase in the size and flavor of the berries.

August 5th. If the weather be hot and dry, supply the border with liquid manure. To prevent this from being, to any extent, lost by evaporation, draw drills about eighteen inches or two feet apart, and a couple of inches deep; and along these, pour the manure, holding the spout of the watering pot, with the nose taken off, close to the bottom of them, that the liquid may not wash the earth into a cream-like consistence, in which case it would cake together, and intercept the rays of the sun in passing through the surface to the roots. When sufficient has been poured into one drill, rake the earth over it, and proceed in like manner till the whole border be manured. This operation, which should be done in the latter part of the day, as soon as the sun has ceased shining on the border, may, if the state of the weather require it, be repeated every two or three days, from the time the fruit is first set, until it becomes ripe, and it will be found very beneficial in promoting the swelling of the berries.

12th. As the berries are now rapidly increasing in size, the thinning of them must be attended to

every seven days, and if oftener, the better. This is rendered necessary, in consequence of the unequal manner in which they sometimes swell. If the berries on any given bunch be thinned so that the remaining ones are all equal in size, it will generally be found on inspecting it five or six days afterwards, that many of them have remained in point of size stationary; while others have grown perhaps twice as large as when previously thinned. In consequence of this, the bunches require frequent examination, in order that all such berries as thus appear by their inferior size to have been deprived of their portion of nourishment, may as speedily as possible be cut out. The oftener this is attended to, the more rapidly will the remaining berries increase in size, and the finer will be their flavor when ripe. To lay down any rule as to the number of berries that should be cut out of any bunch of a given weight, is impracticable. I have many times found that, of bunches of the black Hamburgh grape, with the berries well set, I have from first to last cut out *four* out of every *five;* while on other bunches of the same sort, having their berries not so thickly set, the diminution has been about *three* out of *five*, and sometimes not more than two out of that number. The best general rule that can be given is, that the berries, during the whole period of their growth until after they have made their last swell, must never be suffered to cluster or to press the sides of each other.

19th. Continue to nail the future bearing shoots firmly, and keep in constant check all tendrils, and lateral and succession shoots, throughout the remaining part of the season. The growth of these will now begin to decrease in vigor, in consequence of the fluids in the vessels of the plant being partially diverted in their course and attracted to the fruit.

Keep the border clear of weeds, and its surface loose and open ; and suffer nothing to be on or near it, that can in the slightest degree intercept the rays of the sun. Solar heat is now the grand desideratum.

If the atmosphere be dry and arid, or if the weather be windy, evaporation will proceed at a prodigious rate ; and unless the nights be still and serene and the dews very copious, the balance betwixt absorption and evaporation will be destroyed. To supply the waste, therefore, that will be thus occasioned in the juices of the vine during this critical period, let the foliage and fruit be now and then watered after sunset, and also the border, in addition to the application of liquid manure to the latter, as before directed. The atmosphere contiguous to the vine will be thereby rendered humid, and thus offer a supply of moisture, which the foliage and fruit will quickly and most advantageously absorb. The whole strength of the vine will now be put in requisition by the daily increasing size of the berries. Pay great attention, therefore, to the thinning of them, and use the scissors *very freely*. Remember that every berry cut out, leaves its share of nourishment to be divided amongst the remaining ones. Leave none but the largest berries, and those as nearly as you can at equal distances from each other on the bunches, bearing in mind that two of the characteristics of a fine bunch of grapes, are *large berries*, of *equal size*.

26. Now, as the period of ripening hastens on, the full benefit of the sun's rays will be of the greatest advantage. Take care, therefore, that no portion of the fruit be shaded by more than the consistence of a single leaf. If through inattention in training the shoots, the leaves should be too crowded in any part, the former must be loosened from the wall, and

renailed at a proper distance from each other, as the leaves must not on any account be pulled off. Stripping off the leaves for the purpose of exposing the fruit to the direct rays of the sun, under the mistaken notion that it will thereby ripen earlier, is a practice that cannot be too strongly condemned. The value of the leaves in protecting the fruit, has already been pointed out; it is only necessary, therefore, further to remark that, as the greater portion of the secretions of the plant is prepared in the leaves, every leaf that is pulled off not only greatly injures the vegetation of the vine, but the bud at the base of the footstalk of the leaf, by being deprived of its principal source of nourishment, is crippled in its growth, and otherwise seriously injured in its vitality. Moreover, if a leaf that is growing near to and on the same shoot as a bunch of fruit, be pulled off, the ripening of the latter will not only be thereby actually retarded, instead of being hastened, but the berries will in consequence never attain their proper size or flavor.

Bloom on the berries will begin to appear about this time, in consequence of which, the bunches must be hereafter handled as lightly as possible, that no more of it may be rubbed off than can well be avoided.

Continue to use the scissors freely in thinning the berries, which must on no account be neglected, as in a few days the operation will be of no use. Do not suppose, that, by thus continually reducing the number of the berries, the weight of the bunches will be lessened, for, quite the reverse will be the case; if the thinning be judiciously performed, every bunch will ultimately weigh more than it otherwise would do, were the whole of the berries suffered to remain.

The grapes are now what is technically called "stoning;" that is, the seeds or stones enclosed in the berries, being in the last stage of their growth, are in the act of being perfected; which, when com-

pleted, is immediately followed by a change of the pulp from a state of acidity to one of a sugary sweetness. During this process of stoning, which lasts, in general, about twenty-eight days, the berries appear to be at a stand in their growth, and do not perceptibly increase in size.

September 2. Now pinch off the extremity of every future bearing shoot, about an inch beyond the last joint, and nail the shoot firmly directly below that joint. This operation, by stopping the sap, causes it to accumulate in the buds, and hastens the maturation of the wood. The sooner, indeed, the future bearers are thus stopped in their growth, the better; but if done before this time, there is danger that the buds will prematurely burst.

As the berries are now about to make their last swell, the thinning of them must be completed. Examine the bunches, therefore, very carefully, and if you meet with any berries, about which a doubt may exist as to whether they ought to be cut out or not, give the vine in all such cases, the benefit of that doubt, and cut them out accordingly. Be assured, that by so doing, you will ultimately gain both in weight and flavor.

9th. The process of stoning being completed, the grapes will now begin to ripen. This will be first indicated by the skins of the berries becoming in a slight degree transparent, and in black grapes, also, by a beautiful purple tinge appearing on those that are most forward. As soon as this change takes place, no reduction of the number of berries on a bunch will increase the size of the remainder.

They should be finally thinned, therefore, before they begin to swell off, after which, indeed, the bunches should never be handled at all, except for the purpose of cutting out such berries as may from time to time be injured by insects, birds, or otherwise.

16th. As the grapes will now be getting ripe, pretty generally, all watering must cease, both of the foliage and the border. A moist atmosphere is most favorable to the growth of the berries, from the period of their setting, to that of making their last swell; after which, neither the atmosphere nor the soil, can well be too dry.

The change which the pulp of the fruit undergoes, at the completion of the ripening process, is highly interesting. It is marked in all bunches that have been properly thinned, by an extraordinary increase in the size of the berries, in a short space of time; the natural consequence of the sudden expansion of the pulp, arising partly from the seed being perfected, and therefore, no longer consuming any portion of it for its nourishment; and partly from the continued action of the solar rays on the full sized berries. I have frequently had berries of the black Hamburgh sort, swell in size in the course of a few days, from a circumference of two inches, to one of three, being an increase of one half.

23d. As the nights will now be getting longer than the days, the cold will increase; in consequence of which, the border must not be forked up any more, during the remainder of the season. Keep the surface of it, however, free from weeds, and from decayed leaves, which latter, if suffered to accumulate, will not only intercept the rays of the sun, but also serve as a harbor for the snails; and these vermin, if not prevented, will do great damage to the fruit, especially in showery weather.

As the grapes are now rapidly approaching to maturity, they will present a sight of the most gratifying description. The beautiful symmetry of the berries, the elegant form of the clusters, and the graceful manner in which they are suspended from the branches,

are in strict unison with the delicious flavor of the fruit, and challenge, alike, our grateful admiration.

30th. Examine the bunches frequently, for the purpose of cutting out injured and decayed berries, which, if suffered to remain, will quickly affect all the adjoining ones.

The fruit will now most probably be attacked by birds and insects; if so, means must be used to protect it. If a few wide-mouthed bottles containing sugared beer, be hung up in different parts of the vine, great numbers of wasps and flies will be enticed into them and destroyed. But if these insects be very numerous, this will only prove a partial protection. The bunches must be bagged, or the entire vine covered with bunting, or some other fabric of a similar description, and this will at the same time protect the fruit from the attacks of birds.

If the former mode be resorted to, the best sort of bags that can be used for that purpose, are those made of hair cloth. The texture of these, being open, and their fabric stiff, the sides of them stand out at a distance from the berries, and thus a free circulation of air is permitted round the surface of the latter, which has the effect of keeping them dry and in good preservation. If hair-cloth bags, however, cannot be procured, crape bags may be used instead; but it must be observed, that, whatever sort may be used, they must be taken off every four or five days, in order to examine the bunches, and to cut out decayed berries, if any should appear. It is necessary, therefore, that the bags should be made large, that they may be taken off and put on again with ease and facility. If the bunches of fruit, however, be numerous, it will be much easier, and better, indeed, to protect the vine with a covering of bunting, or leno, or of some other fabric that is thin, and also open in its texture. But, as the exclusion of air thus occasioned will op-

erate injuriously with respect to the keeping of the fruit, if the covering be continually kept on, it will be necessary to remove it every night, and replace it every morning; or, if it be temporarily nailed to the top of the wall, which is the better way, it can be drawn up and let down again as circumstances may require. If this be not attended to, it will be found that the covering, by excluding the air, will cause the fruit to lose its flavor, and to decay.

It must also be mentioned that rats and mice are very fond of grapes; and that when they attack them, they destroy a great quantity in a short space of time. The visits of these vermin, though made generally in the dark, may soon be detected by laying in the evening, a linen or other cloth along the border close to the wall, and directly under the fruit; and if it be attacked by them in the night, their dung, dropped while consuming the fruit, will invariably be found on the cloth in the morning. If it should appear that they infest the fruit, prompt means must be taken to destroy them, for they travel with the greatest facility over every branch of the vine, from one extremity of it to the other, and will most assuredly, if not prevented, speedily devour the whole crop. Amongst the means which may be resorted to, to ensure their destruction, may be employed with advantage the laying of poison on the branches contiguous to the fruit; and also the setting of traps well baited with fresh toasted cheese, and secured to the wall close to the main branches of the vine, along which it is supposed they go to commit their depredations.

October 7. Continue to remove decayed leaves from the border, and suffer nothing to accumulate on it that can either shade it or harbor the snails. If these are not prevented, they will soon find hiding-places in the vicinity of the wall; and in the night,

and also in wet weather, will crawl up the surface of it, and commit great havoc amongst the fruit. To prevent this, the wall should be carefully looked over every three or four days; and when the weather is wet, every day will not be too often. A large shell snail will destroy a large bunch of grapes in twenty-four hours. This fact will show the necessity of looking sharply after these vermin.

Take care not to cut any of the fruit until it be thoroughly ripe. This is so often done, that it deserves to be mentioned as one of the many capital errors that are committed almost universally in the culture of the vine. There is a certain point of time when grapes attain their highest degree of maturity; but that is not when they first *appear* to be ripe, but a considerable period afterwards. There are so many circumstances, however, that influence the ripening of grapes on open walls, that it is impossible to lay down any rule for determining the precise period when they will have reached their extreme point of maturity. The season, the soil, the culture, the sort of grape, and lastly the aspect, modified as this is by a variety of local circumstances, either accelerate or retard the maturity of the fruit, as they combine favorably or unfavorably. It is seldom, indeed, that all the fruit of a vine becomes ripe at the same period of time. And it is worthy of remark, also, that every bunch of grapes ripens progressively, beginning first at what is called "the shoulders," or that part next to the footstalk, and proceeding downwards to the extremity of the bunch. And so slowly is this process carried on in backward seasons and in unfavorable aspects, that there is frequently from ten to fifteen days' difference in the time betwixt the ripening of the shoulders and the extremity of the same bunch of fruit. And if a vine be overcropped to any extent, its vital energies will be exhausted before the process of maturation is

completed; in which case, the extremities of the bunches never ripen, but shrivel and decay. Without, therefore, venturing to give any very specific directions with respect to *the vintage*, it may be laid down as a good general rule, applicable in most cases, that after the period when all the berries of a bunch of grapes have first become apparently ripe, the bunch ought to remain on the vine a month longer, in order that, by the continued action of the solar rays, the watery portion of the pulp may be evaporated, and the sugary portion thereby relatively increased.

It is of great importance, also, in gathering the fruit, that it be cut in dry weather, on the warmest days that can be selected, and not till after the morning dew has been entirely dissipated. The juice of the grapes is materially concerned in these respects; for if the weather be very damp and foggy for two or three days in succession, or if a heavy rain continue for twenty-four hours, or longer, the water in the berries will be considerably increased, and their flavor and sweetness proportionately diminished.

Such branches of the vine as have no fruit on them, should now, without loss of time, be subjected to the operation of the pruning knife.

14. In dry weather examine the bunches frequently, and carefully cut out all decayed berries. Protect the fruit, also, as fast as it ripens, from wasps, flies, &c.

If the extremities of any of the bunches are not yet ripened, cut them off immediately, as the few berries growing on them, will, if suffered to remain, cost the vine a greater effort to mature them, than three or four times the same number has, that are situated near the footstalks.

21st. Keep the border clear of weeds; and as soon as decayed leaves appear on it, remove them immediately, and continue so to do until all the fruit be cut.

The beneficial effects of shading the fruit with a continuous surface of leaves, will now be distinctly seen. Grapes so protected, will uniformly be found to ripen earlier, to be larger in size, and better flavored, and to be covered with a bloom nearly if not quite equal to that on grapes ripened under glass. The leaves will also be of great advantage in keeping the fruit dry and warm, and in protecting it from the injurious effects of heavy rains, which is of great consequence: for if the fruit be kept dry, it will remain on the vine in good condition, and preserve its flavor for a long time yet to come. But if it be exposed to the effects of every rainy day and night, all the previous good culture will be lost, and nothing will prevent a great portion of it from perishing, independently of the consideration that the remainder will be greatly deteriorated in flavor from the effects of the wet.

In gathering the fruit as it becomes ripe, it will be best to choose, first, such bunches as hang within two feet of the ground, the berries on these being apt to rot, in consequence of the damp exhalations that now begin to rise from it; and next, all such as are on the upper part of the wall, above six feet from the ground, (if the wall reach that height,) these being exposed to the injurious effects of the wind; thus leaving to be gathered last, those bunches that hang from two to six feet from the bottom of the wall. If the wall have a projecting coping, the fruit on it will keep much longer than on a wall that is destitute of such a protection.

28th. The leaves will now begin to fall pretty fast, and where a good collection of vines are planted, the great variety of tints and shades of color of the leaves, in their different stages of decay, will present a pleasing object to the eye, and offer to the mind an interesting subject of contemplation. The fine dark purple red of the claret grape leaves, contrast charm-

ingly with the bright yellow shades of the white sweet water and the rich vermilion tints of the black muscadine.

November 4th. As long as any bunches of fruit remain, they must be examined every three or four days, and all decayed berries carefully cut out.

The wasps and flies that now remain, will be too weak to injure the fruit. If covering the vine, therefore, or bagging the bunches has been resorted to, to protect the fruit, it should now be discontinued, and netting substituted in its stead. Nets offer but little obstruction to the free circulation of the air, the benefit of which will now be more than ever necessary to keep the fruit dry. In putting the netting on, great care must be taken that the extremities of it are in close contact with the wall, and the body of a sufficient distance from its surface, that the birds may be prevented from getting inside, or picking the berries through the meshes. To effect this latter object, procure some sticks or bits of lath, about a foot in length, and making the ends smooth, cut a notch or two at one end of each of them. Put the smooth ends against the wall, and the notched ones against the netting, which must be stretched out sufficiently far from the wall to admit of the sticks being perpendicular to the surface of it. Place the cords of the netting in the notches, and the sticks will then keep their position. The netting will thus be in a strain, and at a sufficient distance from the fruit to keep it out of the reach of the birds. These precautions will be found necessary, as the delicious flavor of the grapes now makes them an object of intense desire to a numerous class of birds that frequent the garden.

These little feathered creatures having been industriously engaged during the preceding part of the year, in rendering the most important services to man, by destroying the larva of a host of insects that prove

destructive to vegetation, now come to enjoy their share of the bounties of Providence; and it would, perhaps, be difficult to prove that their claim is not as well founded as that of the lords of the creation. They waste, however, and spoil so much, in comparison with what they really eat, that no other course can be pursued, than that of rejecting their claim altogether. Amongst these claimants the blue titmouse, (tom tit) *Paros cæruleus*, will, in general, be found to be the most persevering. This elegant little bird visits the grapes about the middle of October, and selects the ripest for examination. If the flavor be agreeable, the work of destruction commences; but if not, an interval of a week or ten days elapses, when a second examination takes place, and the fruit being then ripe, the banquet begins by his attacking invariably the finest grapes on the vine, and consuming about the sixth part of each berry, leaving the other five-sixths to rot and waste. After this, he never ceases to pay his daily visits as long as a single bunch remains, and the slightest chance appears of a possibility of getting at it.

As soon as any shoots are divested of their fruit they should be pruned immediately.

11. *Fall of the leaf.* This interesting event takes place in general about this time. In well sheltered situations, some vines will retain their foliage to the end of this month, but in aspects that are exposed to the effects of the wind, the leaves are generally shed in the early part of it.

After the grapes have been deprived of the protection of the leaves, they begin to lose both weight and flavor; but if the aspect be favorable, and the wall have a projecting coping, they may be preserved in pretty good condition a fortnight or three weeks longer, after which, however, no reliance can be placed on the continuance of their flavor; although in some

instances, when the weather is very favorable, and great care is used in keeping the grapes dry, and in protecting them by proper coverings from the effects of severe frosts, they may be kept on the vine in tolerable preservation till the beginning of January.

Many methods have been devised to preserve grapes after they have been cut from the vine, but none that I am aware of, have ever proved very effectual. The best of these, however, will be found, I believe, to be that of cutting off an entire branch of the vine with the fruit upon it, and sealing the cut end with sealing-wax, and then hanging it up in a dry and warm room, in which there is a pretty free circulation of air. The greater quantity of wood that the branch contains behind the last bunch of fruit, the longer will the latter keep; but it may be remarked, that with every precaution that can be taken, the fruit may in general be preserved much better by letting it remain on the vine, and protecting it by proper means from the severity of the weather.

CHAPTER XIII.

GENERAL AUTUMNAL PRUNING.

MANY reasons of a decisive nature, point out the autumn as the proper season for pruning the vine. When by judicious management the branches of a vine are kept within a small compass, its vegetative powers become exceedingly vigorous; and the quantity of superabundant wood that is necessary to be cut out at the close of every season, being in general very great in proportion to that which is retained,

the number of channels for the future ascent of the sap becomes, after the general pruning, proportionately limited. In consequence of this, the sap acquires, at its rising, a corresponding increase of strength and velocity; and unless the vine be pruned early in the autumn, in order that the utmost possible period of time may intervene, to harden the extremities and such other parts of the branches as the pruning-knife has passed over, previously to the ascent of the sap in the following spring; the sap, at its rising, will burst through the wounds, and the vine will bleed profusely at all points. To guard against the occurrence of this very injurious casualty, there is no other way than to prune at the earliest period possible in the autumn.

The sooner, also, that the vine is pruned in the fall of the year, the earlier will its buds unfold in the ensuing spring; the cause of which may be thus explained. The buds, from their first development, are endowed with the power of attracting a sufficient quantity of the juices of the plant to nourish them and to promote their growth. But this power, although it gradually increases with their growth, is held in subjection throughout the summer, by a similar but superior power possessed by the fruit, which in an extraordinary degree diverts the fluids of the plant, and appropriates them to its own growth and maturation. As soon, however, as the fruit is ripened, this power which it previously possessed, becomes nearly extinct, and the fluids of the plant are then chiefly appropriated to the nourishment of the buds, and to the growth of the roots and branches. Now, as the great effort of the vine in ripening its fruit is made either before the autumnal equinox or immediately after it, while the sap is yet moving pretty briskly, if the vine be pruned shortly after that period, the sap quickly accumulates in the shoots that

are retained, and the buds attracting it very powerfully, rapidly advance in their growth and maturation. They thus steal a march, as it were, on their next year's vegetation. But if the vine be pruned *too early*, before the motion of the sap is sufficiently weakened by the declining power of the sun, the buds then feed themselves to repletion, and prematurely burst. Hence it follows, that the most advantageous period for the general pruning of the vine, must, undoubtedly, be that point of time when the sap can be made to accumulate in the buds in such quantity as to increase them to their utmost possible size, *without bursting them*. And this point of time cannot with safety be considered as having arrived till the first of October. A single branch of a moderate sized vine, may be cut out or shortened, as early as the middle of September, but the whole vine cannot be pruned, and its entire body of sap thereby suddenly checked in its motion, before the expiration of that month, without incurring very great risk of bursting the buds, independently, also, of giving to the vital powers of the plant an injurious shock, by performing such a severe operation prematurely. As soon, however, as the month of October commences, and the fruit is cut, the general pruning should be done, and the buds, in consequence, increasing in size by the accumulation of the sap, become thereby endowed with a greater degree of vitality than they would otherwise possess. They are thus enabled to attract the sap at its rising, with more power, and consequently to expand themselves earlier than the buds of a vine pruned later in the season; and this is an advantage not to be estimated lightly, in a country where the summers are barely long enough to ripen the fruit.

In addition to the foregoing reasons, others will

hereafter incidentally appear, in favor of early autumnal pruning.

In giving directions for the general pruning of the vine, it is scarcely possible to lay down any rules for the guidance of the pruner, except such as are of general application. If the vine has been attended to throughout the summer, in the manner directed in preceding Register, there will be comparatively little to do at the autumnal pruning. As vines, however, are managed in a great variety of ways, it appears necessary to give such directions as will apply in a general manner to any vine, whatever may have been the method in which it has been previously pruned and trained.

Before doing this, however, a few observations may be made relative to vines that have been suffered to cover a disproportionate extent of walling, and which have, as a necessary consequence, a great number of old, naked and barren limbs. Vines of this description, when their leaves are shed, present a perfect chaos of useless branches, the general appearance of which, bids defiance to anything like systematic pruning. To give any directions, therefore, that can be practically followed in the pruning of such vines, is next to impossible; the only course that can be recommended to be adopted, with respect to any vine that is in this state, is to cut it down to a complete stump. By doing this, the fruit will be only sacrificed for one season; for the next year after this operation has been performed, the vine will send forth an abundant quantity of the finest description of bearing shoots, which in the following year will produce as much fruit, with only a tenth part of the trouble in the management of it, as could be obtained if the previous course of culture had been continued. There is no other way, indeed, of reno-

vating a vine than this, for no method of pruning that can be adopted, will ever get rid of the old, blank wood, and procure in its stead a proper supply of bearing wood within a reasonable distance of the stem. Vines that are cut down in this manner, will frequently produce in the following summer very fine bearing shoots upwards of forty feet long.

When it is deemed advisable, therefore, to renew the branches of a vine by thus cutting it down, the best time to perform the operation is the latter part of the month of November. If the stem be short, cut it off about five inches above the ground, but if it be long, leave it of such a height as it is intended to train the future bearing wood; remembering that whatever portion of the naked stem be left, the shoots will be emitted from the *upper part* of it. As soon as the vine is cut off, sear the wound well with a hot iron and then seal the surface of it over with sealing-wax, in order to prevent the sap, at its rising, from bursting through.

In the following spring a great number of buds will push near the top of the stump, and these being allowed to swell sufficiently to shew their relative strength, as many of the strongest as are required should be selected to remain, and all the rest rubbed off. The shoots being carefully trained throughout the summer, will present in the autumn an abundant choice for future bearers.

DIRECTIONS FOR THE AUTUMNAL PRUNING.

1st. Every nail must be drawn from the wall, and every shred taken off the branches. This will give the vine great relief, the shreds having, throughout the summer, kept those parts of the branches which they have encircled from the beneficial influence of

the sun and air. They also become the receptacles of numerous insects, and if woolen shreds have been used, they are very retentive of moisture, and if suffered to remain, would chill the juices of the plant and thereby retard its vegetation in the spring. In unnailing the branches, care must be taken not to draw all the nails at once, as the former would then be left destitute of their necessary support. Unnail a part at a time, therefore, and having pruned that part, renail it in a temporary manner, before any other part of the vine be pruned, and so proceed till the whole be pruned. Observe that every nail before it is drawn, must be driven farther into the wall by a good blow or two on its head with the hammer, in order to disengage it from the mortar; otherwise in drawing it out, portions of the mortar which adhere to it, would be drawn with it, and the joints of the wall would be thereby defaced and injured.

2d. Ascertain the girth of the stem, and calculate the quantity of fruit which the vine can mature in the following year, agreeably to the scale given in page 34, and assuming (for the sake of making the operation clear) that the strength of the vine is equal to the maturation of fifty pounds weight of fruit, the number of buds that it will be advisable to retain to produce that quantity, will be from ninety to a hundred. Now before selecting the shoots that are to contain this number of buds, means must be taken to provide for a proper supply of future bearing wood. For this purpose choose some of the strongest current year's shoots that are situated nearest to the stem of the vine, and at appropriate distances from each other, and cut each of these down to the two lowermost buds. The number of shoots to be thus spurred must not be less than two, nor need they be more than six.

Having thus provided for the supply of future bearing wood, proceed in the next place, to select the shoots that are to be retained as fruit bearers. In doing this, remember that good bearing wood is almost invariably *round* and *hard*, of a *good size*, and *short-jointed*, with *large prominent buds*, that are, in general, rather *round* at their extremities. Bearing these qualities in mind, choose such shoots as answer this description, and that are situatad nearest to the stem, but sufficiently distant from each other to admit of their fruiting shoots being conveniently trained in the next summer without being crowded. Shorten each shoot to such part of it as is sound and hard, retaining as many well ripened buds as possible. Let the shoots be situated in equal numbers on each of the main branches; *for instance*, if the vine contain only two arms, similar to *figure* 3 (page 89), and four bearing shoots be retained, let two be situated on each arm; also, let the two shoots on one arm contain the same number of buds, or nearly so, as the two on the other arm. Now, count the buds on each shoot, omitting the two bottom ones, and set apart the required number *on the fewest shoots possible.* Having done this, cut all the other parts of the vine entirely away, retaining only those on which are situated these bearing shoots and the spurs to produce future bearers; the main object in view, being to *get rid of the greatest quantity possible of old wood.* But if any of the shoots that are to be thus cut away, should be favorably situated for the production of bearing shoots at some future period, leave on all such the lowermost bud, but with respect to all the rest, cut them out close to their respective parent branches.

3d. Cut out from the bearing shoots that are retained all their lateral shoots close to the base of the

buds, and also the remaining portions of the tendrils and footstalks of the bunches of fruit, (if any,) as well as all excrescences, and every portion of dead wood that remains in the vine. Prune them all smoothly, close to their parent branches, in a clean and workmanlike manner, leaving behind no unsightly, ragged edges or extremities to disfigure the vine.

4th. If any part of the outer bark of the stem or branches be decayed, which will be easily seen by its loose and ragged appearance, peel or scrape off all such parts with a blunt edged pocket knife, taking care not to wound, or in any way injure the live bark. The decayed bark, having lost its vitality, and with it its power of resisting and throwing off the rain, becomes so highly retentive of moisture, as to be almost sopping wet throughout the winter months, especially if several layers of it have been suffered to accumulate. In this state, if permitted to remain, it speedily generates moss, and becomes also the receptacle of innumerable insects. It is contrary, indeed, to every known principle of vegetable life, that a plant like the vine, which is a native of a warm climate, should ever flourish while its stem and branches are thus encircled with a decayed bandage, covered with moss and saturated with moisture, which constantly chills its juices, and thereby paralyzes the beneficial effects of the sun and air, during a period of the year when they are of the last importance to the health of the plant. The annual removal of the decayed bark, therefore, may be regarded as a point of culture that tends very greatly to promote the prosperous vegetation of the vine.

5th. The barking of the vine being finished, the whole operation will be completed, and the branches must then be nailed to the wall in a temporary manner. In doing this, remember that the wind has very

little power over the naked wood, and that, therefore, a few strong shreds nailed firmly over the branches at proper distances, will be sufficient to protect them. Let the bearing shoots be nailed on those parts of the wall where they will receive the greatest portion of the sun's rays, without any regard to the situation which they will subsequently be made to occupy at the winter training. The vine, thus pruned, barked, and nailed, will be in readiness to receive the influence of the season at the earliest period possible, and will, throughout the winter, present a beautiful appearance of dormant vegetation.

CHAPTER XIV.

ON THE WINTER MANAGEMENT OF THE VINE.

December 1st. The winter being the proper time to manure the border, let it now be lightly forked up, and a good coating of manure laid over it about six inches deep, which will answer the twofold purpose of enriching the border and protecting the roots of the vine. It has been already stated, that, after a vine has been planted a few years, its roots will make their way up to the surface, if the border be not disturbed by cropping or digging; but it is necessary to observe, that when they are so situated, their tender fibres will inevitably perish, unless protected from severe weather, during the depth of the winter. To prevent this, therefore, and also to keep the roots as *warm* as possible, the border should be covered over through

this and the two following months. For this purpose, long stable manure about half made, is the most suitable, as, from its spiritous nature, it will keep the soil warmer, and more effectually resist the frost and other unfavorable atmospheric changes, than any other description of manure. If this, however, cannot conveniently be procured, the next best covering is that of dead leaves, which, after they are decomposed, form a vegetable manure of the most fertilizing description. But if these cannot be obtained, any of the manures mentioned as fit for top dressing (page 60) may be substituted. It must be observed, that, as the roots require to be kept as *dry* as possible in the winter, *liquid* manure should be used very sparingly during that period.

The roots being thus protected, nothing more is required to be done till the month of March.

March 1st. If the season be forward, the vine must now be permanently trained, but if otherwise, that operation may be performed any time during the next fortnight. Observe, however, that as soon as the buds have swelled sufficiently to burst the extremities of their winter covering, the vine must be trained immediately; for if delayed, the buds will be liable to be rubbed off, in bending the shoots and nailing them in their proper positions.

This is the proper time, also, previously to the vine being permanently trained for the season, to wash the wall agreeably to the directions given in page 65.

In nailing the shoots in the manner directed in the chapter on Training, use *fresh* shreds, and be careful not to put any round those parts of the vine that have been at any previous time covered with shreds. The training being finished, remove the covering from the border, leaving as much of it to remain as may be advantageously mixed with the soil. Fork up the

border, and mix the manure well with it : after which, rake the surface very smooth and clean.

March 21. As soon after this time as the weather is dry, *salt the border.* For this purpose, procure a gallon of salt for every square rod, and scatter it in the same manner as if it were seed, distributing it as equally as possible over the entire border. Then rake the surface very lightly, in order that the salt be mixed with the soil. The application of salt to a vine border, is productive of the most beneficial effects. It prevents the growth of weeds, destroys the worms, keeps the surface open and clean, stimulates the growth of the vine, and ultimately enters largely into its constitution. Any substance, indeed, of a saline nature, the roots of vines seize upon with the greatest avidity.

If, at the rising of the sap, the vine should bleed at any of the wounds made by pruning or otherwise, put a piece of moistened bladder round the wounded part, and tie it closely and firmly with a strong thread well waxed with beeswax.